MODERN
PEACH PRUNER

BRÉHAUT.

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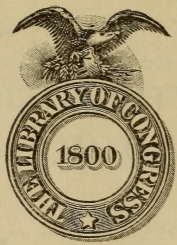

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THE

MODERN PEACH PRUNER,

TREATING ON THE

LONG AND CLOSE SYSTEMS OF

PRUNING THE PEACH,

ADAPTED FOR THE OPEN AIR, AND FOR ALL FORMS OF ORCHARD-HOUSE CULTURE.

WITH NUMEROUS ORIGINAL ILLUSTRATIONS.

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BY THE

REV. T. COLLINGS BRÉHAUT,

Author of "Cordon Training of Fruit Trees," &c. &c.

TO WHICH IS ADDED,

NOTES ON VARIATION FROM SEED,

BY MR. THOMAS RIVERS.

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TO

THOMAS RIVERS,

OF SAWBRIDGEWORTH,

IN TOKEN OF PRIVATE FRIENDSHIP,

AND OF RESPECT FOR HIS LONG AND USEFUL SERVICES

IN THE CAUSE OF HORTICULTURE,

This Work

IS DEDICATED BY

THOMAS C. BRÉHAUT.

RICHMOND HOUSE,
Guernsey, February 7th, 1866.

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THE

MODERN PEACH PRUNER.

No. 1.—Introductory Remarks, and History of the Peach.

It is probable that more books have been written on the subject of the Peach than on that of any other fruit. But this is by no means surprising when we consider the large sums expended on its culture, its beauty, and ever-increasing popularity.

The demand for information has in consequence proportionally augmented, especially since the introduction of orchard-houses. These structures have created a special class of growers; varieties, some of semi-tropical parentage, are now fruited, which before were entirely unknown to us, and which require a certain skill to bring to perfection. We are no longer satisfied with a short season for the enjoyment of this noble fruit, but require a succession which shall last through the summer

and autumn, besides the spring Peaches obtained by forcing.

This is certainly a considerable advance upon former years, and in consequence much of the old-established styles of management are unsuited to the wants of the present day. More especially the system of long pruning of the shoots, with its tedious dis-budding, and considerable winter shortening-in of the leading branches, has been found inadequate to represent new ideas, and modern experience. Many of the works of the older writers have inherent defects which vitiate the otherwise sound principles laid down in them. They too often pre-suppose a greater amount of knowledge in the general reader (such a class as is now much more common) than is usually found to be the case. Hence the rules given are too vague to be of practical use: there is a want of detail, and of classification. For example, although the best continental authorities approve of naming and classifying the Peach shoots (for convenience of reference), this is first attempted in the present work in this country, and is done with the sanction of those best qualified to judge.

Great confusion was sure to follow from having two systems—one for the orchard-house, and another for the open air. It is now proposed to avoid this by means of one general method of

pruning, which, with simple and obvious modifications, should serve for every purpose.

Throughout a much closer style of pruning of the shoots, and little or no shortening-in of the branches has been recommended, which is only a recurrence to first principles.

The frontispiece, showing the appearance of the shoots in the autumn, after having been closely summer-stopped, is an example of the new style. This is pruning on the "alternate system."

The original system of close pruning, begun thirty years ago at Chartres, by Mons. Grin, is described, being the only authentic account in this country. But the exigencies of an English climate required a larger style of treatment, so as to supply vacancies, and blank spaces caused by accidents, &c., and all this is secured by the alternate system. This is adapted either for trees on the open wall, or for diagonal cordons on the back walls of orchard-houses. Nor does the pruning of trees in pots essentially differ. In this consists the general system proposed.

The Peach (*Persica vulgaris*) has been arranged in two grand divisions of freestones and clingstones, and then in three sub-divisions, as follows:—

The first has leaves serrated and glandless.

The second has leaves crenated or serrulated, with reniform or kidney-shaped glands. The third has leaves crenated or serrulated, with globose glands. Flowers are described as large, medium-sized, or small.

In its native country, Persia, the Peach, as a standard, attains to a very moderate height only. It is cultivated as a standard in Asia Minor, China, America, and the south of Europe. In tropical climates the Pavie (clingstone) Peaches attain to large sizes. Opinions differ as to their merit, many connoisseurs preferring these hard fleshed fruits. Matured by the fierce summer sun of America, this class of Peach, with a yellow flesh, and having an Apricot flavour, is much admired, and certainly excellent. The difficulty is to obtain like results in England. This is impossible without skill and some artificial means.

A Peach (not, however, a clingstone, but of this style), the Early Crawford, is well known in the Northern States, and is also one of the most successfully grown in our orchard-houses. Others have been introduced of late also promising good results. Golden Rathripe, Exquisite, Canary, Bergen's Yellow, and Susquehanna, are all excellent yellow-fleshed American Peaches. Mitchell's Mammoth (a clingstone Peach), as also Thomas's

Late November and Baldwin's Late (also clingstones), are handsome and valuable acquisitions. The last, being a November Peach, shows how the season is now extended. From the beginning of July to the beginning of November is the range obtainable, and this not with one sort only, but with a certain number, each widely differing in appearance and flavour.

Among European yellow Peaches the Admirable Jaune is decidedly the best, and is grown to perfection in orchard-houses here. Few Peaches are so remarkable in form as the Honey Peach from China. It has quite the appearance of an almond. Many, however, of our finest old varieties are still high in favour, as a glance at any fruit catalogue shows. But no one can venture to predict what sorts may be valuable in the future. In fact, Peach culture is in a state of transition; and an interesting paper, written by Mr. Thomas Rivers expressly to illustrate this fact, and styled "Variations from Seed," will be found at the end of this work. As orchard-houses generally advance the period of ripening annually, and as new seedlings are raised remarkable for earliness, we may reasonably expect to have good-sized Peaches ripe in June, or even in May, in due time, without forcing.

Of the history of the Peach little is really reliable. Probably about the reign of Claudius

the Romans introduced this fruit into Europe. Columella describes it under its name, Persica, as a species of laurel (Persea), and ascribes poisonous qualities to it. But Pliny the elder, who died A.D. 79, refutes this error, and distinctly states that in his day there were already five sorts existing. The oldest variety of which we can most clearly trace back the history is, according to Noisette, the Late Admirable, supposed to be identical with the "Lucca Peach."

It would seem, however, that the Chinese were acquainted with Peaches and Nectarines from very early dates. This is evident from the writings of their ancient poets and others. In all of them it is easy to trace the recognition of the tradition of the "tree of life and death," and of the fatal consequences of eating of the forbidden fruit—according to these, the Peach. Confucius was born about 550 years B.C., and was well acquainted with the Mosaical writings. The religious opinions of the Chinese are extremely obscure, so that the distinctness of the tradition is somewhat remarkable. Not that all Peaches had an evil quality, for almond-shaped fruits (of which the Honey Peach is a good example) are symbolical of a long and healthy life, especially if highly coloured. But, on the other hand, round and dark brown Peaches (like Galande) are symbols of death.

Figures and paintings of this fruit ornament the walls and furniture of the Chinese. They are presented to parents and superiors, and when out of season imitations in porcelain are used.

In 1573 Tusser speaks only of red and white varieties. In 1629 Parkinson enumerates twenty-one sorts, and Miller thirty-one in 1750. In 1806 the number had reached to sixty-seven, of forty of which Forsyth gives particulars. In the present day the list is much larger, as is well known.

No. 2.—Theory of Vegetation.

Without having the pretension to enter very largely into the difficult subject of vegetable physiology, and wishing at the same time not to exceed the limits originally proposed for my notes, it will, nevertheless, be proper to devote two or three chapters to an examination of the principles which regulate vegetation.

In this case theory must necessarily precede and govern practice; nor is it prudent for the horticulturist at any time to separate them.

It is not always at first setting out that the amateur, eager as he may be for information, is in a position to profit by the numerous works on the principles of vegetation. From many causes he generally reverses the natural order of things, and

begins by experiments based on the teaching of unlearned and often deeply prejudiced men. The consequence is, that after a series of years passed in alternate success and failure, he finds himself compelled to return to first principles, and to make an attempt, often futile, to unlearn nearly all he formerly knew; and this often occurs when his practical manipulation had attained a pitch which, had it been regulated by a sound acquaintance with the laws of vegetation, would have placed him in the highest rank. It is obvious, then, that a treatise on Peach pruning, such as this one, must commence at the beginning. It shall be the especial object of the writer to make this portion of the subject as brief and as simple in detail as possible, while nothing that is important to the amateur will be omitted.

Commencing by an analysis of the organs of plants, we find that, in general, what are designated as the elementary organs, or the primitive formations of matter, are known as cellular and vascular tissues. The cellular tissue appears first, and is composed of small cells, while vascular tissue is composed of tubes, pierced with lateral openings, and enclosing the original cellular tissue between them. Cellular tissue forms the softer portions of plants, and vascular the harder portions.

Roots are composed of the neck or collar, of the taproot from which the roots ramify, and of fibrous rootlets, at the extremities of which are the spongioles, which from the soil absorb the nourishment of the tree. The spongioles, as seen under a microscope, are composed of cellular tissue, and are of the greatest importance to the life of the tree.

The trunk of the tree is composed of the pith, the ligneous body, and the bark. The pith is formed of cellular tissue, bound together by the tubes of the vascular tissue. In this position these tubes act as vessels of the medullary canal. From the natural deviation of these vessels arise the leaves and the buds, and after these the green or growing shoot. The ligneous body lies between the pith and the bark. If we cut through the trunk transversely, the ligneous body is seen in the form of concentric layers, each the growth of one year. Permeating these layers are the medullary rays which connect the medullary canal with the circumference. If, however, the trunk be cut through vertically, the ligneous fibres of the layers are seen to be formed by the union of vessels derived from the base of the leaves, and reaching downwards to the spongioles. The ligneous fibres, produced by the upper leaves, lie over those produced by the lower leaves. Thus the ex-

terior layers are the latest deposited, and the youngest.

The ligneous body itself is composed of hard wood or heart, and of alburnum or soft wood. The heart, formed of the innermost layers, is composed of tissue, which material deposits have completely filled up. The alburnum, or recently-formed ligneous substance, is situated between the heart and the bark of the tree. The outer layers contain the sap-vessels, which perform their important functions in proportion to their formation.

The bark comprehends the liber, and the cortical layers. The liber is the interior portion of the bark, and covers the alburnum. The liber is the seat of vitality in the tree. It is composed, therefore, of a certain number of thin layers of vessels, having their origin at the base of a leaf, and their extremity at the spongioles. While, however, in the ligneous body, the exterior layers are the latest produced, in the liber, on the contrary, the newest are the innermost ones. The cortical layers are those formed by the oldest ones of the liber. In young subjects the liber is covered with thin tissues, called respectively inner and outer epidermis.

The bud, situated at the axil of the leaves, is the rudiment of the young shoot. It is formed by a deviation of the vessels of the medullary canal.

Leaves are composed of footstalks, and the blade or body of the leaf. The footstalk of the leaf is formed by the vessels of the medullary canal. These vessels ramify in the tissue, and form the channels of the sap. The body of the leaf is formed of cellular tissue covered with a thin skin or epidermis, which is pierced with innumerable apertures called stomata. In fact, these stomata or mouths are to be found on all growing portions of vegetables, not only on the leaves, as before stated, but also on the shoots themselves, and on the fruit. Their functions are very important in vegetable life, as will be explained presently.

Flowers are composed of floral envelopes and of sexual organs. The floral envelopes are the calyx and the corolla. The divisions of the calyx are known as sepals, and those of the corolla as petals. The sexual organs are the stamens and the pistil. The stamens are the male organs of plants. The anther, at the extremity of the stamen, contains the pollen or fertilising dust. The pistil is the female organ of plants, the extremity of which is called the stigma, and the base the ovary, while the intermediate space is called the style.

The fruit is composed of the pericarp, a fleshy substance which is formed of cellular tissue, and of the seeds. The seed contains the rudiment of a similar plant.

The embryo comprehends the radicle or rudiment of the root, the plumule or rudiment of the stem, and cotyledons, whose office it is to supply nourishment to the young plant before the appearance of the leaves.

No. 3.—Phenomena connected with Growth.

The substances necessary for the life of plants are absorbed by them from the soil, by means of the roots, and from the atmosphere, by means of the leaves. De Jussieu calls these last "aërial roots." Their functions, in some degree, resemble those of the human lungs. They absorb from the air the water and carbonic acid which they require. Roots draw from the soil mineral and saline materials, besides the carbon and nitrogen which artificial manures supply.

The spongioles alone are the absorbing organs of the roots; nutritive substances are introduced by them in the form of liquids, which proves how indispensable water is to vegetation. Fluid nourishment is, therefore, the basis of the growth of plants. It is elaborated in the leaves, under the influence of the solar rays during the day. Under the name of sap it ascends to the leaf-stalks, passes into the venous ramifications, and from thence into the cellular tissue of the leaf.

A portion is returned to the atmosphere, the rest remains to feed the plant.

The carbonic acid of the air is also absorbed by the leaves, unites with the matter drawn by the spongioles from the soil, and is decomposed in the tissue of the leaves, in order to become nutritious matter.

The sap, elaborated in this manner, takes the name of cambium, and, changed in the nature which it had during its ascent, it becomes proper and suitable for the increase of the plant. The sap ascends to the leaves through the outer layers of the alburnum, or young wood, during the day. It descends during the night to the spongioles by the innermost layers (that is, by the newest formed) of the liber, composing thus a new layer of ligneous fibre, and a new layer of liber. This is the manner of growth in trees. There is, however, this difference, that while the ascent of the sap increases the length, the descent of the matured sap, or cambium, increases the breadth of plants.

In spring, the sap-vessels are already gorged before the leaves show. Thence arises a pressure on the axils of the buds, which precipitates the young shoot into extension. The cambium descending, on the other hand, solidifies the young shoot by means of the new layers which it interposes. The cambium gives breadth as well as

solidity. We can thus readily comprehend how a shoot which has pushed forth in some portion of a tree, deprived of the sun's rays, is unnaturally long, and soft in its component parts. The leaves of that shoot not having been exposed to the action of light, the cambium has not been elaborated in the texture. The sap remains much as it was during its ascent; the inner portion of the growing shoot is spongy and soft, the cambium being the means of hardening it, and the shoot has received little or none. On the other hand, a shoot which springs from that side of the branch which is fully exposed to light is short, and the wood is hard, well coloured, and fruitful.

The descent of the cambium is by the innermost layers of the liber, and it forms the ligneous layers which cover the medullary canal, and also the new vessels of the liber.

These ligneous and cortical layers, when formed from the cambium, elaborated in the upper leaves, are placed above those formed by the lower leaves. The ligneous layers are, however, composed from the centre outwards—*i.e.*, the newest layer is that farthest from the centre. But the cortical layers are formed from the circumference to the centre—*i.e.*, the newest layer is the innermost. Each year, then, a new layer of alburnum covers that formed during the preceding year. When the cellular

tissues are filled in they become hard, and of a deeper colour. This is the "heart" of the tree, but the sap does not pass through these obstructed vessels any more. This portion, however, is the real support of the tree against violent winds. In like manner each year sees new liber grow, while the oldest layers, now external, possess no longer vitality, and become dry and wrinkled.

The growth of roots is owing to the descent of the cambium, by the addition of new cellular tissue to the spongioles. It is evident, then, how mutilation of these is injurious to the welfare of the tree, and how a healthy equilibrium between root and shoot is a first requisite to its healthy vitality. When these spongioles become obstructed they cannot absorb the materials of the soil, and thus the tree languishes and dies. A portion of the cambium in the autumn does not descend to the roots, but is reserved by nature to feed the young shoots before the leaves expand in spring. In shoots, the inner epidermis is formed by the aid of this reserved cambium. The first action of the spongioles in spring may also be due to its influence, in some measure.

In like manner we may readily understand the growth of the fruit. Fruit is composed of cellular tissue; like the leaves, the epidermis is full of stomata or mouths. The parenchyma of fruits has

its functions as well as that of the leaves. The sap ascending from the roots is developed therein, the useless portions are evaporated into the atmosphere, the nutritious substances remain in the cells, where they are decomposed by the oxygen to form nutriment for the growing fruit. These fruits absorb a very large proportion of sap for their own use, and do not restore it to the general use of the tree as the leaves do. This is how the too abundant production of fruit exhausts the vitality of the tree, and how the crop of one year affects that of the next.

During the period of growth fruits inhale carbonic acid, and exhale oxygen; but when quite ripe they absorb oxygen, and set free carbonic acid. When, then, all this acid is disposed of, and replaced by oxygen, the fruit is perfectly ripe, and decay is not far off. In all these processes we see what an important part water plays, whether in the soil as the means of conveying the nutriment to the plant, or in the air in the condition of vapour. In the soil it dissolves the substances it meets there; in the body of the tree, as sap, it is the vehicle of these nutritive substances; and in the air, in the state of vapour, it remedies any undue dryness of the soil. A superabundance of humidity is, however, an evil. Trees grow, but produce but little fruit when moisture is too abundant.

Not less important than water is air. Without it the sap would not be converted into cambium. The roots decay when withdrawn from the influence of the air. Soil must, therefore, be permeable.

Without light trees could not feed, nor produce fruit. Light accelerates the maturing of the sap, by causing an evaporation of the superabundant water in the cellular tissue of the leaves. The roots are thus stimulated to absorb more liquid nourishment. The more light, the more root action. A bright light is needed for the leaves to decompose the carbonic acid accumulated in their tissue. Light flavours and colours the fruit.

Heat is also an indispensable agent in vegetation. It stimulates the energy of plants, especially when combined with moisture. Even during periods of great heat, the sap, then much stimulated, brings into the leaves some of the coolness of the soil derived through the roots, thus preserving the leaves from being injured by the solar rays. During the winter, on the contrary, the sap circulates very slowly, but still brings with it something of the latent earth heat, which is higher than that of the atmosphere, and thus counterbalance its coldness.

No. 4.—Soils and Manures.

The particular kinds of soil which are adapted for Peach-culture must now be considered. A more important consideration cannot well occupy the attention of the growers of all stone fruit. The subject is a large and difficult one, and is far from well understood. It is not pretended, therefore, to give more than an outline of certain established truths, which, it is hoped, will induce cultivators to examine more carefully the nature of the soil composing their gardens, so as in some measure to secure materials now known to be indispensable in Peach-culture.

There are three principal earths which enter, more or less largely, into the composition of all soils; these are clay, silex, and lime. Soils are made by a complex combination of materials obtained from these three primitive earths. These materials vary considerably in their proportions, and so affect the general nature of the soil, which, moreover, depends very much on the quality of the subsoil. For example: a chalky subsoil gives a whitish appearance to the surface soil; when red sandstone constitutes the subsoil the earth above it has a reddish hue; on gravel it has a yellow tinge, and on blue clay it appears greyish.

Clay is a constituent of all good soils; in fertile ones there may be 15 per cent.; but in those which are barren 40 per cent. Its absence makes a soil too dry, while too much of it constitutes a soil retentive of moisture, and apt to harden and crack with heat. The rays of the sun cannot penetrate stiff clays. The red clay soils are the hardest, and the black clay the most plastic. The purest clay contains at least 60 per cent. of sand, and is always mixed with mineral and other substances. Clay soils, properly treated, are among the very best for stone fruit. The first consideration is to drain them thoroughly of superabundant water, which would otherwise result in soft, spongy wood, and moss on the trees. The next thing is to incorporate with them all such materials as will render them permeable by the air. This should be done to the depth of at least 2 feet, by means of steel forks, using for this purpose such materials as sand, coal ashes, gravel, lime from very old buildings (of this a large proportion), broken pottery, pounded oyster-shells, &c.; in fact, any thing to keep the soil open. The general border-drainage of such soils should be itself 12 or more inches in depth, according to the quality of the clay. Drainage withdraws the water from the roots, and allows the air and sun's heat to reach them, and supply that warmth

which is absolutely required for carrying on their functions.

A main drain, at least 4 feet deep, running under the walks, and connected with this border at intervals, is requisite, unless in the case of stony subsoils. It is hardly known how much drainage, well carried out, increases the temperature of the borders. Whatever tends to increase the temperature of the soil, in naturally cold and damp countries, is of the highest importance. Continental writers are not so explicit on this point, but possibly the amount of evaporation lessens the danger. Of late years this subject has gained ground even among them.

Silex, or sand, is found more or less in all soils. Sands vary much in colour. Sand more unequally reduced forms gravel; when flinty, it is termed silicious; with mica, micaceous; when very fine, dust. Silica allows water to evaporate from it twice as fast as chalk, and three times as fast as clay. Sandy soils are early, and wrought easily, but are incapable of great production. They are "hungry soils," and in them manures soon disappear: these should, therefore, be applied only for the crop of the current year. Silicious soils vary in colour from white to red, according to the quantity of oxide of iron which they contain. They are friable and penetrable to a great extent

by the air, but liable to dry up. There are, however, exceptions to this general rule. In some parts of the eastern counties of England there are large tracts of land composed of calcareous sand. These soils are apt to become binding rather than dry on the surface, and as such they are more fertile than loosely-constituted silicious soils. Usually loose sandy districts are very unfertile when planted with fruit trees, especially Peach trees. Such soils should be mixed largely with stiff alluvial loam, and have rich surface dressings and mulchings in times of drought. Soils thus treated are much improved, but whilst the Peach grows fairly in them, the fruits, though of good flavour, are not large. In order to supply carbonate of lime freely, powdered lime rubbish and gravel mixed (so as to separate the particles), the whole spread over the surface, would gradually find its way by the infiltration of water all through the soil. Thus only could a silicious earth, rendered firm by clay with lime added, be called a fair Peach soil. Pure silex is extremely barren. When, however, it appears of a reddish colour it indicates the presence of oxide of iron, which combines readily with the oxygen of the atmosphere and retains it. These ferruginous soils are excellent. When silex is in too great a quantity there is an abundance of blossom, but the fruits

are not so large as in other cases. The leaves of the trees are also more liable to curl, and the attacks of aphides.

The third chief earth found in soils is lime. The value of lime in the culture of the Peach, the Vine, and indeed all fruit trees, has not yet been fairly estimated. Lime appears in soils in the form of carbonate of lime, or chalk. Without the admixture of other substances essentially chalky soils are very unfertile. A chalky subsoil is unfavourable to fruit culture. Calcareous soils absorb moisture, and dry up with equal rapidity. Calcareous matter is, however, of the highest necessity in Peach culture. Its absence is at once perceived by the falling of the fruit at the period of stoning, because carbonate of lime constitutes a considerable portion of the stone. Sand and clay are the appropriate ingredients to mix with chalky soils, so as to render them more firm, yet permeable and fertile. Clay destroys the whiteness of the chalk, which is unfavourable to the due absorption of the sun's rays. An incident strongly corroborative of what has been advanced respecting the value of lime, occurred lately at Sawbridgeworth. The soil of that nursery is very largely mixed up with comminuted chalk; the water is therefore impregnated largely with carbonate of lime, and its effects on Peach trees and Vines in pots have this

year been remarkable. The trees and Vines were copiously watered, and a thick deposit of lime was found adhering to the drainage. The roots were finely developed, while vigorous and healthy growth was visible everywhere. Other experiments have fully established the value of lime.

The border for Peach trees should always have a good slope. Its width, for walls 10 feet high, should be about 5 feet, provided this space is never encroached on. A rich calcareous loam, of an unctuous texture, soft to the touch, made pervious to air and heat, is a favourable soil for the Peach. Manures should be gradually forked in, but the roots should be so near the surface that forking 3 inches deep would be dangerous. These Peach-borders should not be further disturbed save for weeding. Although thus near the surface, roots can be readily protected from the effects of evaporation during the summer by mulchings of litter, and, in the same way, from excessive cold.

Calcareous matter (old lime rubbish, powdered oyster-shells, and broken bones), should be added to the extent of one-sixth of the soil. Manures composed of well-rotted vegetable refuse, intermixed with stable-droppings, allowed to stand for some time before using, and well turned fortnightly, with lime and soot intermixed, are excellent. Summer mulching should not be applied till the

earth has been well warmed by the sun. Charred earth soaked in manure water is highly stimulating, but should be carefully used.

Although the list of manures is long, many Peach-growers are of opinion that such as are of slow decomposition (as old woollen materials) are the best; at any rate, vegetable manures are of much value, and are too often neglected. These, well applied, should not be buried too deep, otherwise fermentation is hindered. Wood ashes offer much that is valuable. The ashes of all vegetable substances contain lime, phosphoric acid, and alkaline salts. There is usually a little charcoal or carbon left which is most valuable. These ashes should be applied when newly burned. The effects of manures, however, much depend on the quality of the soil to which they are applied, and on its state at the time of application. Manures should be thoroughly incorporated with the soil.

In the case of orchard-houses a well-drained locality is absolutely indispensable. Many failures occur from neglecting to examine into the nature of the subsoil on which the building is to stand. Mr. Rivers has so often insisted on this point that it is surprising it is not better understood. Any situation almost is preferable to a cold ill-drained one. It must be evident that no Peach-blossoms can set in such houses, shut up as they may also

happen to be at that season. The manures required for orchard-house trees are naturally of rather a more stimulating character than for trees in the open air. Thus, rich surface-dressings often renewed are required. Liquid manures and weak guano water, alternately each week in the summer season, are beneficial applications. This chapter, however, can only be considered as suggestive, and as such only is it offered.

No. 5.—Aspects and Shelters.

The proper aspect for the Peach tree in England should be as nearly due south as can be secured. South-east ranks next, and after this south-west. Much, however, depends on the locality of the garden and the position of the nearest shelter from high and cold currents of air. The prevailing winds must be carefully considered as to their effects on vegetation, and the Peach wall removed as much as possible from their full force. In France, M. Dubreuil recommended the south-east as the very best aspect. At Montreuil, where the sun's rays are scorching in summer, an east or west aspect is generally preferred. In mid-France they place the late varieties facing the south. The early kinds and the bulk of the trees are assigned to the east walls; but none are placed on west

walls if it can be avoided. At Montreuil so powerful is even the early sun, that trees flourish which have no sun after 10 a.m. In such aspects, however, the trees make very long shoots, and give extra trouble to the pruner.

The proper height for a good Peach wall must be regulated in some measure by the situation. Where the ground is level, and the aspect south, the wall may be the highest. Very splendid fruit can be grown even on walls 6 feet high; indeed, many are greatly in favour of low walls, as promoting free circulation of air in low and confined situations. The Montreuil walls are only 8 or 9 feet high; but then the form of training there admits of no riders, and favours considerable lateral extension of the branches. If low walls are adopted—that is, about the height of those at Montreuil — about 20 feet horizontally will be requisite for the trees to develope themselves laterally. If, on the contrary, the garden wall be 12 feet high, the trees may be planted at 15 feet intervals from stem to stem, with riders placed midway between them to cover the upper parts of the wall, which the dwarf-trained trees below could not ascend to. In favourable soil and climates the Peach tree, when doing well, will, however, greatly exceed these limits, but there is nothing gained by these immense trees. It must

be borne in mind that the modern methods of training the Peach do not favour such extension; they rather favour the practice of having more trees in the same space, by which plan many advantages are gained, as will be seen presently.

Of the utility of copings there is little doubt. These should be fixed, and projecting not more than 3 or 4 inches, as more than this would shade the upper branches by June, and intercept the dews and warm summer showers. Besides these permanent copings, iron brackets should be fixed into the walls, close under the copings. These brackets should project outwards about 12 inches. They should be of the shape of a triangle, one side secured against the wall, and on the upper side boards of inch-deal should be laid and screwed to the brackets. When the fruit has set, these boards should be removed and laid by till, in many localities where the rainfall is great, the heavy rains of September necessitate their being replaced. In southern districts this may not be required.

But the Peach requires other defences against the bad weather, in the shape of stout tiffany screens or protectors reaching from the brackets to within 2 feet of the ground. Lower is not needed for the safety of the blossoms. These protectors should be used from February till the

fruit has fairly set, and they should be left off gradually. Their object being to protect the young leaves, and especially to favour the setting of the fruit, they should be drawn up during the day, and let down only at night, or during storms of wind and rain, or fogs. Great care is needed not to stifle the growth of the tree. On the utility and daily management of tiffany protectors, I quote from a letter from the Rev. W. F. Radclyffe. To show how situation affects temperature, he says, "Being in a valley close to the water, the frosts are severe. After black frosts cease, for eight or ten weeks hoar frosts succeed. It would be hopeless to grow Peaches without efficient protection. Fir boughs and netting would here be moonshine. I find the leaves even more tender than the blossoms. In severe winters like this I keep on the protectors, unless the weather is mild, by night and sometimes by day. Snow or sleet should never get into the trees. The protectors are put on as soon as the fruit-buds swell. They are let down at 4 p.m. and raised in fine weather at 10 a.m. If the weather is bad they remain on even for several days. They must be left off gradually, as cold draughts are injurious."

It remains only to mention that I have seen instances where much injury was done to the trees by these protectors being placed too near to them,

the wind, by impinging directly on the surface of the protectors, causing them to beat sharply against the leaves and blossoms.

It seems useless to expect a crop of Peaches, even in favoured localities, without some such protection as the above. Nor is the expense great, these protectors serving for several seasons, and the trouble is amply repaid. During the hard frosts of winter the Peach tree may suffer; but the danger is not in reality great in ordinary seasons, provided the wood of the tree is ripe. The difference this makes in the welfare of the tree is very great, nor is it surprising when we remember that the Peach is a native of Persia. Though the winter frosts of that country are exceedingly severe, yet the Peach tree survives them simply because the fierce sun of the preceding summer has most thoroughly ripened the young wood; it is rather the excess of autumn rainfall in England, after a cloudy summer, which endangers the vitality of the tree. If to this be added injudicious pruning and cold undrained borders, what possible chance of success can be expected?

Let us, then, be very careful to secure such an aspect as shall best ripen the wood; then shelter from cold currents of wind mingled with rain must be obtained. Generally speaking such shelter should be perpendicular, facing the wall. Air is

elastic and readily turned aside. Openings, however small, must increase the violence of the blast. Plunging winds without outlet, as in the case of small gardens enclosed by high walls, are extremely unfavourable. Imagine such a rush of air for hours together, and directed against unsheltered trees, and this during a period of low temperature, and then you will feel no surprise at their being unproductive and diseased.

Every advantage, then, must be taken of neighbouring shelter in laying out a garden. On the western coasts the general exposure of the whole garden should be sheltered from the south-west quarter. In the Channel Islands, exposed as they are to the force of the Atlantic gales, this is carefully studied. Each year brings disasters to our gardens, and we do not so much dread winds from an eastern quarter as from a western. In the eastern counties of England, however, all testimony goes to prove how fearfully destructive to the tender leaves and shoots of the Peach are the cold evaporating effects of a continuous east wind. Above all, let the amateur direct his attention to securing this shelter without losing unnecessarily one precious ray of sunshine in our cloudy regions: therefore the protection must be somewhat distant from the trees, and yet not too far. On very long walls temporary screens, placed across the borders

so as to deflect the scud of the wind, are advantageous, but buttresses to the walls throw a dangerous shade, and are not to be recommended.

The material of which the wall is constructed is not very important. Brick seems, on the whole, the best material, and wire trellisses are, no doubt, by far the best to use for training purposes and for obtaining beautiful forms; still the old shreds of cloth have many advantages, as have also studs fixed in the wall for training to them with soft wire. The great object is to secure the radiated heat of the wall. It is astonishing what a difference an inch makes in this way. Some have even recommended obtaining a succession of crops by varying the space between the branches and the wall, but modern practice relies more on the numerous varieties of fruit now known.

The "Modern Peach-pruner" has no faith in the practical utility of heated walls. What are glazed coverings for Peach walls but narrow and stifling contrivances to effect what wide and commodious orchard-houses do so much better? When once we desert the time-honoured open wall, now so elaborately furnished with Peach appliances, why should we adopt half-measures, and middle courses? not to speak of the great advantage of combining the two methods so as to secure the best of each. I mean that in a combination of

a good Peach wall, with a properly-managed orchard-house, the amateur will find everything he can reasonably desire. This, at least, is within the reach of many, whilst the more expensive heated Peach-house can still be added by such as wish an earlier produce.

No. 6.—Transplanting.

The time and mode of planting a young Peach tree may now be considered. Very much of the after-success of the tree depends on this being rightly done; therefore it is a more important operation than at first sight might appear.

A tree may either be reared in our own gardens, or it may be purchased at some neighbouring nursery. In either case it need not be long out of the ground; and this constitutes a case differing somewhat from that in which trees are received from a distance.

In the first supposition, if the tree has been trained against a warm wall, with all its branches and shoots fully exposed to the sun, then it will be in first-rate condition for transplanting. By taking care of the all-important spongioles, by replanting, at a short interval of time, carefully in a suitable soil, and on a mild and genial day, no check will take place, and root and leaf will soon resume

their reciprocal functions. Supposing the tree not to have been reared under such favourable conditions, but still not to have been more than a few hours out of the ground before replanting, it may then also be depended upon (care being taken not to mutilate the roots, which is the main point) to continue its growth without much check.

In both these cases early planting is recommended. The leaves being still on the branches, though they droop when the tree is lifted, they will soon recover their state of tension, and be ready to receive their daily supply of sap from the roots, which, being unmutilated, will also shortly recommence their proper functions.

We may even expect that some new cellular tissue will be added to the spongioles, by reason of this early change of place before winter comes on; for if transplanting be done in October, there is at that period much latent and unexpended earth heat, which heat is absolutely necessary to enable the roots to extract from the soil the food proper for the tree. Besides, the leaves being also uninjured, begin to elaborate the fresh sap, and so increase that reserve of cambium, which some think is dispersed in the interior tissues of the tree, for the purpose of preserving its vitality during the trials of the winter season. This seems a reasonable supposition, and an explanation of the

reason why early transplanting is so beneficial when properly performed. Our French neighbours are not unaware of this, for, at Montreuil, November is considered to be the proper month for planting; but then there is, no doubt, as much heat in the earth during November in that sunny spot as there is in our cloudy land during October. When, however, trees are received from a distance the case is different. The leaves cannot be expected to recover, and no advantage can be obtained by planting so early. Provided, then, care is taken to anticipate the extreme cold of November, early in that month is a suitable time.

Should early planting be impossible, it is not a bad plan to wait till mild weather sets in in February or March. Dry, windy, or sunny days, are unfavourable for transplanting, on account of the amount of evaporation they promote in the tree: for even when the trees are without leaves, evaporation takes place through the bark; and if there be no corresponding absorption of moisture through the spongioles to supply this waste, they being out of the ground, the tree suffers. A mild, rather damp day is then the best for the operation we are describing.

Of course, young trees are by far the most easy to remove. Whenever large fruit trees are transplanted, men, of great experience in such matters,

tell us that the success of the operation depends mainly on the quantity of earth removed with the roots. They also recommend such large trees to be removed in a growing state, because the moisture remaining in the earth adhering to the roots is at once assimilated as food for the tree. But when the earth is cold, and the tree dormant, this moisture surrounding the roots is not absorbed by them, nor can it be. The result is, that it has rather a tendency to rot the roots, more especially those portions which have been injured. There is no doubt that the whole subject of transplantation is a very interesting one, and deserves careful study.

The process of planting is as follows:—Having chosen the young Peach tree for its clear and polished bark, the proper distance to place the stem from the wall is about six inches. Some say four inches; but on the authority of the best cultivators in England, it is stated at six.

If the tree is to be planted where no other has stood, a hole twice the diameter of the roots when spread out is sufficient. If otherwise, the old soil must be removed, and the opening made much wider. A piece of pavement, or a wide flat stone is generally placed under the tree to prevent the roots striking downwards. The old monks always did this, and famous gardeners they were. Roots grow in tiers; therefore the lowest tier must be

carefully spread out all round, occupying the ground without crossing each other if possible. Fine pulverised soil must be shaken over this lowest tier, but no manure must ever touch them. Never tread on the roots, as so many do, and never move the tree up and down, which absurd practice has the effect of doubling up the fine ends of the roots underneath. Break down the sides of the hole for fresh earth, and place pieces of turf cut from a rich field for the roots to run into at their first start. Then the upper tier of the roots should be spread out fanwise in the same careful way, and equally covered. When the earth is filled in to three-fourths, water freely in light soils, and less in firm ones. More water in any case should be given to trees planted in the spring. Mulching at the time of transplanting is an excellent old custom; it excludes frost, and lessens evaporation.

Deep planting is an evil in the case of fruit trees. No tree should be planted deeper than it formerly grew, or it will be in danger of having its roots stifled for want of air; and this will cause the tree to languish, till, by an effort of nature, it pushes out roots nearer to the surface for air. Thus delay will arise instead of progress. It is by far the best, especially in firm and retentive soils, to plant the tree so that a small mound is ne-

cessary to cover the roots. Let these be within an inch or so of the surface—the ground will always settle. Deep planting should always be avoided. If done, the tree makes no spring growth, but grows late in the year—exactly the reverse of what we require.

Some trees are notoriously more difficult to transplant than others. Some place them in this order as to risk—first the Cherry, then the Apricot, and then the Peach; but if carefully done there is little real danger. We should never forget to secure transplanted trees firmly to the wall, for fear of high winds.

In the case of the Peach there is always a certain danger lest the buds which have remained latent during the whole of one season should not break at all; therefore the tree may be headed down soon after it is planted, as a rule. Nevertheless, could we secure the roots intact, there would be little need of this. If the tree has been grown in a pot the roots ought to be entire; and having shaken out most of the ball of earth, the roots should then be spread out well, and no shortening ought to be required. This, of course, presupposes that the tree, while in a pot, has been regularly trained for the particular form required.

On the whole, it cannot be said that trees which have been more than three years in pots are the

best suited for planting out. The roots become strong, and have an inward twist, which makes it perilous to endeavour to open them out well. A year or two may be passed with very great profit if the trees be well looked to, and pots changed as the roots fill them. Up to three years this may be done; and certainly the way that vertical cordons, three years established in large pots, and full of fruit-buds, both grow and bear the season after they are planted out, would astonish those who depreciate pot-cultivation.

No. 7.—Useful Maxims.

1. It is essential to form the tree into two equal wings, so as to direct the main current of the ascending sap into two channels. By this means it is best mastered and held in check. The sap has always a very great tendency to flow in a vertical direction, therefore any vertical line is a difficulty in training. The consequence of a neglect of this law in vegetation is that the lower portion of a tree becomes feeble, bears small fruit, is exhausted even by this production, languishes, and dries up, while the upper branches, receiving a superabundance of sap which cannot be elaborated, become rankly luxuriant, and so produce few flower-buds.

2. In forming a tree it is an error to trust to shortening back the branches at the winter pruning. A better mode would be, during the period of growth, to incline a too strong branch to a horizontal direction, and to tie up vertically a too weak branch. Of all the plans adopted for this purpose this is the simplest and the most efficacious. The weaker branch should also be allowed a greater freedom, so that the sun and air may have free access all around it. Any shoots on the weaker branch which are to be ultimately removed, should be allowed to remain on it as long as possible, to attract the sap to it. The more leaves thus left the more strength does the branch gain. The contrary practice, of course, should be applied to the too vigorous branch of the other wing. Fruits exhaust the branch, as they require much sap to nourish them; therefore, we should not leave too many on a weak branch, where, however, they generally soonest appear.

By a combination of these simple means the equilibrium of the vegetation of the tree may be restored during the season of growth, leaving comparatively little to be done at the winter pruning. Considerable amputations always injure trees, however well performed. The modern school especially recognises this principle, which is so much aided by the summer-stopping of the shoots, that

little or no shortening of the leading branches is ever required, We require all the growth a tree can make; and the object proposed by shortening-in the branches, often by fully one-third of their length, so as to make the lower eyes break, can and ought to be obtained by more natural means. If we take care of the fruitful shoots these will soon master the branch. The only use of the latter is to carry the former, and these should be especially attended to.

3. If we wish to obtain fruitful shoots the branches must be left as long as possible. A contrary practice produces only excessively vigorous shoots which are unfruitful. Trees only produce flower-buds when, after having acquired a certain development, the sap circulates more slowly. The forms which trained trees are made to assume, very much contribute to favour the production of flower-buds, by distributing the current of the sap into diverging lines, and avoiding all vertical lines. The more these forms are completed, the more trouble the sap has to circulate, and the more time it has to become fully elaborated in the leaves by the action of the light, and air. The sap, converted into cambium, must also descend more slowly by each separate channel. This is a valuable aid towards the production of fruit-buds, these, probably, being produced by the descending

fluid alone. Be this as it may (and the question is not as yet satisfactorily decided) all seem agreed that, to a diminished circulation is owing the formation of the genuine fruit-bud. Lifting the tree, without injuring the roots, is a powerful remedy when it is too vigorous, and making rank growths. In many forms, however, which will be hereafter more fully entered into, the lifting is never necessary in Peach trees, because by summer-stopping the shoots are rendered fruitful, while the roots, from the close planting of the trees, cannot acquire any undue development. In the orchard-house I have never lifted any Peach trees, because fertility was obtainable by the other means described. Diagonal cordon Peach trees, having only short fruitful shoots on the main branches or leaders, are easily restrained in vigour. The fruit are produced close to the main leaders, by which they receive the direct action of the sap, and so become largest.

4. It is an axiom in Peach culture thus to obtain the fruit close to the base of the shoots. When, on the contrary, these shoots are allowed to produce spray, as well as the spurs, a number of useless flower-buds are formed which the tree has no strength to mature. The sap is exhausted by following so many needless channels, and the fruits either fall at the period of stoning, or remain small

and hard. This defect is apparent chiefly in trees pruned on the "long system." On the other hand, by close and judicious summer-stopping, in ordinary summers, the flower-buds will be developed near the very base of each shoot.

5. During severe weather no pruning whatever should be undertaken, either of trees in the open air or in the orchard-house. The danger lies in exposing by the cut the orifices of the sap-vessels; these burst, and are liable to decay. Such trees as are exhausted by their crop should be cut early in the autumn. This operation relieves the tree, and aids in promoting the next year's crop. After a sunny and dry summer the wood is ripe, and should also be pruned early, for the reason mentioned above.

6. Never prune the Peach tree much at one time. If pruned during the period of growth, much sap is lost from the wounded shoots before they can cicatrise. If this occurs in the winter, that being the time for any more important change, the tree always feels it. Bending down branches even at that time is not always a safe operation, unless gradually done, because at the lower portion, where the bend occurs, the bark is compressed, and the sap cannot ascend nor descend there so well as it did previously. On the other hand, the upper portion of the bark is distended extremely,

and there is much risk of a very strong wood shoot pushing vertically. A portion of the winter pruning should, therefore, be left for February; many shoots about which the pruner had not made up his mind may then be regulated, not to mention the numerous unavoidable accidents which occur during a whole season, and disorder all our calculations.

7. Above all, let the amateur avoid considerable amputations of his Peach trees. When he has to perform one, let him cut cleanly and as close as he can to the base of the ramification.

No. 8.—Long Peach Shoots.

Hardly any matter is of such importance in Peach-pruning as a right knowledge of the distinctive characters of the shoots. That they differ widely is certain, therefore any instruction on this point, must be founded on some common principles, before it can be of real value. Even the practised pruner is instinctively guided by certain well-established rules, in his selection or rejection of the coming season's wood, but these rules are the result of longer experience than usually happens to the amateur. The almost entire absence of any classification of Peach shoots in the works of the older writers was an essential defect, and rendered

much of their excellent teaching practically useless. Possibly this was owing, in a great measure, to the paucity of illustrations common in those days, for without such invaluable aids it seems simply impossible even now to attempt any profitable instruction.

Modern practice, indeed, by a species of reaction, has rather erred on the side of copious illustration joined to minute detail; but the result has been good: the amateur has largely profited thereby, and this alone would have amply justified the new method.

There is, then, no classification of Peach shoots of any value till we take up Professor Dubreuil's late work on the general subject of fruit culture. Taking, then, this high authority for our basis, we can the more readily approach this interesting portion of our subject.

Under M. Dubreuil's system all shoots are divided into six distinct classes. After careful consideration, this number has been extended to eight, and the whole has been re-arranged in two divisions. The first four classes are mainly found in long pruning, while the remaining four, though occurring also in that system, are principally to be found in close pruning, and especially in all orchard-house work. This division is also convenient for reference. Every type of shoot which

occurs in ordinary cases will be found ranged under one or other division. To show the unaccountable neglect into which this matter had fallen, it will be enough to mention that new names have been given to several of the classes, which, though well known to pruners, had no recognised nomenclature. These names have been added under the sanction of the best authority, while the shoots themselves have been carefully drawn from nature by practised hands. They possess the additional value of being now engraved, for the first time, of the natural dimensions, by which means they can be much more readily distinguished.

1st Division of Peach Shoots.

1. *The Wood Shoot.—Fig.* 1 is the wood shoot of the purest type; *rameau à bois*, of Dubreuil. This is a vigorous class, and indicates either a very early stage of development, or, if found in the case of older trees, rather a superfluous amount of sap. It is depicted with the leaf-buds just elongating under the influence of the continuous movement of the ascending sap, exercising an almost mechanical pressure at their axils. Under the powerful influences of light and heat, in a short time each of these buds will become a green

shoot provided with leaves, which, elaborating the sap, will speedily augment the dimensions of the whole, both in length and in breadth. This class of shoots is common on young and growing trees. When it occurs as an extension, it is far better to endeavour, by judicious summer-stopping of the buds A, A, A, as they lengthen into shoots, to make them fruit-bearing, and then little or no shortening-in of the extension will be needed at the winter pruning. The tree will thus gain much. A contrary practice will end in producing other wood shoots of No. 1 class, arising from the buds A, A, A. Whenever this unfortunate circumstance occurs, then these wood shoots should be cut very short back to try for fruit again. Of course, it is not supposed that this class of shoot should be laid-in for bearing purposes at the winter pruning. It is naturally a long shoot, and has occasionally some feeble blossom-buds near its extremity, which are valueless. At the lowest A (at the junction of the one and two-year-old wood), we perceive a wood-bud, which will probably become a short fruit-bearing spur.

2. *The Fruit Shoot. Rameau à fruit, proprement dit,* Dubreuil.—*Fig.* 2. is a type of the ordinary fruit-bearing shoot. This shoot is a good specimen of the long-pruning style. The blossom-buds at B, B, B, are all double, and have a leaf-bud between

Fig. 1.
THE WOOD SHOOT.

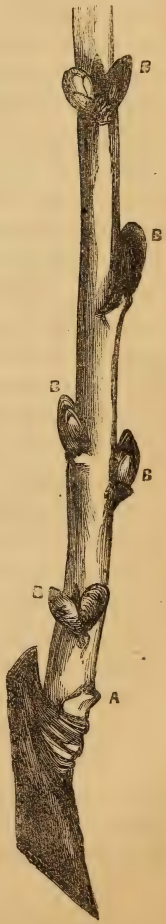

Fig. 2.
THE FRUIT SHOOT.

them. Sometimes they occur as a single blossom-bud, and a single leaf-bud. This formation is easy to manage, and is variously treated. Sometimes the shoot is laid-in at full length, a reprehensible practice, except in the case of exhausted trees where leaves principally are wanted; and sometimes, being cut back to about 10 inches, it is partially disbudded, which seems a waste of material. This class, however, will bear much ill-treatment, chiefly because it can hardly be cut-in wrongly, as there is a leaf-bud present with each group of blossom-buds.

3. *The Mixed Shoot* (*fig.* 3), *Rameau mixte,* Dubreuil.—This class partakes of the characters of Nos. 1 and 2, having the leaf-buds of the former (only frequently doubled) for some way up, and then changing into the fruit-bearing groups peculiar to No. 2. It indicates a stronger growth than class No. 2, and is probably due to a vertical position at the upper side of some branch, or an extension of some bush tree. Perhaps a cold wet spring, abruptly succeeded by bright sun, has altered its character, and caused blossom-buds to be produced high up the shoot. These changes are, however, subject to laws not yet well explained. This class requires careful summer handling, and is more difficult to prune than No. 2. At the winter season, if it present the

appearance here shown, it would be well to cut it in very short, and thus divide it. To cut it long so as to bear is, indeed, long pruning, and cannot be recommended here. As an extension it is, however, excellent.

4. *The Gross Shoot* (*fig.* 4), *Gourmand*, Dubreuil. —This is a dangerous class, and it should never be permitted to appear except as an extension. It is represented of the ordinary thickness, but frequently becomes very much stronger. From it are developed laterals of summer growth, which are called "*anticipés*" (literally, premature shoots) by the French. These summer laterals are the bugbear of very close pruners, for on their careful management or otherwise depends the character of their work. We notice that the leaf-buds A are generally not so prominent as in class 1; and on the laterals, in the case of that on the right, the leaf-buds are double, and well placed at the insertion of the lateral on the parent shoot, and therefore no blank space will appear when these laterals are transformed into fruit-bearers. In the case of the left-hand lateral, however, these two leaf-buds are suspiciously distant, and the dormant bud visible at the base cannot be depended on, and if not developed during the ensuing season, probably never will be. This is a peculiarity of the Peach, therefore the right-hand lateral is of much greater

Fig. 3.
THE MIXED SHOOT.

Fig. 4.
THE GROSS SHOOT.

value than the left-hand one. At B B we notice feeble blossom-buds, with a terminal bud, C. These laterals vary considerably in size, of course. In mid France they become independent shoots, and able to bear, owing to the growth made under those favourable conditions. No. 4 should be checked whenever not needed. It is known by its erect character, darker colour, and well-developed leaves, and should be stopped to about two inches when it has made about six inches of growth. It will then divide into two weaker shoots of some class or other, generally of No. 1, and become manageable. The *anticipés*, or premature shoots, require a chapter to themselves, and will be further discussed when we come to close pruning.

These four classes have much in common, as No. 1 easily passes into No. 4, according to circumstances. No. 2 is the highest organisation, of course, and No. 3 a class only of a mixed character. More need not be said at present on this head, as these shoots will have to be referred to continually.

No. 9.—Short Peach Shoots.

We now come to the consideration of the shorter shoots of the Peach. These valuable classes have hardly met with the notice they deserve at the

hands of long pruners. Indeed, in some works it is recommended to suppress them as much as possible. This is a great error; for other writers, such as Knight and Dubreuil, recommend their careful preservation, wherever found at all possible; and in the works of such masters of close pruning as Professor Gressent, of Orleans, and M. Grin, of Chartres, the main dependance for fruit is placed on Class 5, which is well known, moreover, to produce the finest specimens. Very close pruning, such as is well suited to orchard-house trees, rarely fails to develope Classes 5 and 7 in great abundance, especially in the case of established trees. Though all the classes of this division occur under every form of training, they are peculiarly the result of that sudden concentration of the sap, during the period of its greatest ascent, at the base of the shoot, which is produced by judicious summer-stopping. In some mysterious way an obstacle is created, which appears to concentrate the cambium in the cellular tissue near the base of the nascent bud, and by this retarded circulation to produce eventually a cluster of blossom-buds, which are eminently fruitful. It is not, however, pretended that late summer-stopping would be so successful.

2ND DIVISION OF PEACH SHOOTS.

5. *The Cluster Shoot or Spur* (*fig.* 5).—The word cluster, which so appropriately represents the appearance of the blossom-buds B, round the terminal leaf-bud C, is synonymous with the French term "bouquet." By this last name this particular spur is known all over France. Dubreuil calls it *rameau à fruit bouquet;* and Gressent and Lepère call it *bouquet de mai.* Knight appears to designate it as a "spur," and the word "cluster" may be considered an appropriate English rendering. Class 5 constitutes the basis of very close pruning, such as that which M. Grin, of Chartres, practises, and is also the end and aim of established orchard-house training. This class is common on the two and three-year-old wood, and indicates both fertility and health in the tree. Under all forms of cordon trained Peach trees this type is abundant. Together with No. 7 it should, in orchard-houses, form the greatest portion of the fruit-bearing shoots. In the case of a Downton Nectarine bush, which had been about eight years in a pot in my orchard-house, out of 120 fruitful shoots no less than 110 were of Classes 5 and 7. The blossom-buds almost all set in clusters of four or five, requiring to be thinned down to one fine specimen. All writers

agree that this class of shoot should not be meddled with or pruned in any way; neither should it ever be rubbed off, no matter where it occurs. It is a perfect type, and will reproduce itself by means of its terminal leaf-bud, besides maturing the finest fruit. At the ensuing season it may present the appearance of

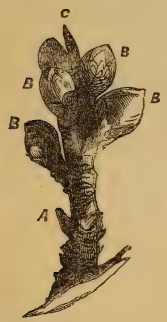

Fig. 5.
THE CLUSTER SPUR.

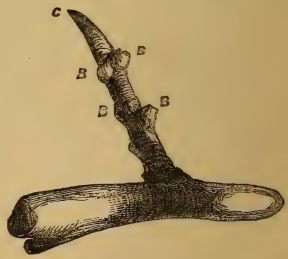

Fig. 6.
FRUIT SPUR AFTER BEARING.

6. *The Fruit Spur after bearing* (*fig.* 6).—This is one of the types of perfect shoots which have been added to M. Dubreuil's classification. It has, therefore, no French synonymous name; nevertheless, it is of a sufficiently distinctive character and appearance to warrant a separate notice. To orchard-house pruners especially it will be welcome, as it is occasionally difficult to treat. The reason is that the specimen, here drawn from nature,

is of a slender form, and the blossom-buds at B have evidently fallen off without setting, which shows a want of vitality in the tree. A shorter and more sturdy form, then, might have been chosen to represent the class, and then it would probably have appeared where the fruit had been attached. This one has not elongated much, the leaf-bud C marks its extreme development; at the same time it is on the point of extension, and will, by the end of the summer, remain a short bearing cluster shoot, all the portion below C being, however, bare ever afterwards. It is certainly a good class of shoot, and should not be suppressed in orchard-house pruning, and rarely, unless a foreright, in out-door work. It will not grow strongly in any case and is, therefore, valuable for bearing next season. It has but the single defect of an inch of unfruitful wood. Not to notice it would be to leave amateurs in ignorance of what the numerous "clusters" look like after the season is over.

7. *The Fruit Spray* (*fig.* 7).—This class is included by Dubreuil under the head of "proper fruit shoots," which he says are "from 4 inches" in length; but from other specimens which were photographed for this work, and which were taken from strong-growing trees, it was seen how this type passes, like the others, into Class No. 2 whenever the blossom-buds are arranged in groups, with

a leaf-bud between them. It is the fact of the single blossom-buds, in which No. 6 alone participates, which marks the distinctive character of this beautiful class. 8 also has only single blossom-buds, but it has no terminal leaf-bud, which No. 7 has; 7 has, therefore, been promoted to the honour of being a separate type, and it occurs very frequently on healthy and well-managed trees, both in-doors and in the open air. This class having a terminal leaf-bud will, besides bearing, extend, and having sometimes a latent bud at the base may, by judicious summer-stopping, become double, in which case, generally, shoots of the same character will be formed. This is a valuable disposition in this class, and, for many reasons, it should be retained instead of being suppressed, as it often is. 5 and 7 are essentially orchard-house shoots, being developed more readily under the somewhat artificial treatment therein practised.

8. *Barren Spray. Chiffon* of Dubreuil (*fig.* 8).—An unsatisfactory class, indicating neglect or a bad habit of the tree itself. There is much difference of opinion among long pruners how to treat this class, but, if retained, they should be cut to above the lowest fruit-bud. They occur in orchard-house bush trees frequently, and show defective pruning, because, by stopping, they would probably have passed into some other type, or, at the worst, dried

up entirely. When very injudiciously managed, a bush tree may soon become crowded with them,

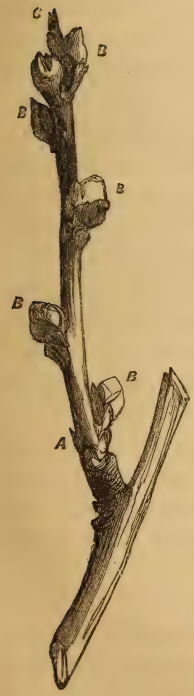

Fig. 7.
THE FRUIT SPRAY.

Fig. 8.
BARREN SPRAY.

some being much longer than the specimen selected, and others having a bare portion below them. All this arises from neglecting to observe that there is no terminal leaf-bud, so that the shoot is blind.

These eight classes of shoots are all that we may look to find in ordinary cases. Wherever there seems any variation from them it is because they are passing into another form; but even this can be readily recognised, and need not cause any perplexity. 1 and 4 are the only pure wood shoots, for the others are more or less all fruit-bearing. It is to be hoped that rules for pruning are simplified by means of this classification. All may not be of one mind as to these rules, but the general principles here laid down were, of course, the first thing requiring to be settled. It may be added here, that, perhaps the very best modern authorities on these matters, have given their approval to this arrangement of the shoots. One great difficulty was to render appropriately the names by which some are known on the continent; another was the want of precision in the current horticultural terms.

No. 10.—Forms of Trees for Long Pruning.

On the question of form, there is not so much real difference of opinion as to the most advantageous

way of managing the shoots. It is true we can find, especially in the French works, a great variety of shapes indicated as suitable, according to circumstances, but many of them are too fantastic to be of any practical use. Examining them is not, however, without profit, for we may generally trace in them some leading principle based on reliable experience. Thus the student will discover that the chief aim and object steadily adhered to, has generally been, to divide, as near the base of the tree as possible, the main current of the ascending sap, into two well-balanced portions. Wherever this leading principle has been departed from, it will be seen that the object then in view was to cover a somewhat lofty wall in the quickest manner, without, at the same time, sacrificing the claim of the lower branches to be properly constituted. For this purpose, the main central stem has been provided, much less lateral expansion has been allowed, whilst the lowest branches have sometimes been turned upwards at their extremities, to favour their development, for that development is always endangered under this form. It is evident that walls of 9 or 10 feet in height, which are by no means the worst suited for many localities, require a shape combining great power of lateral expansion, without sacrificing the harmonious proportions of the whole tree. To accomplish

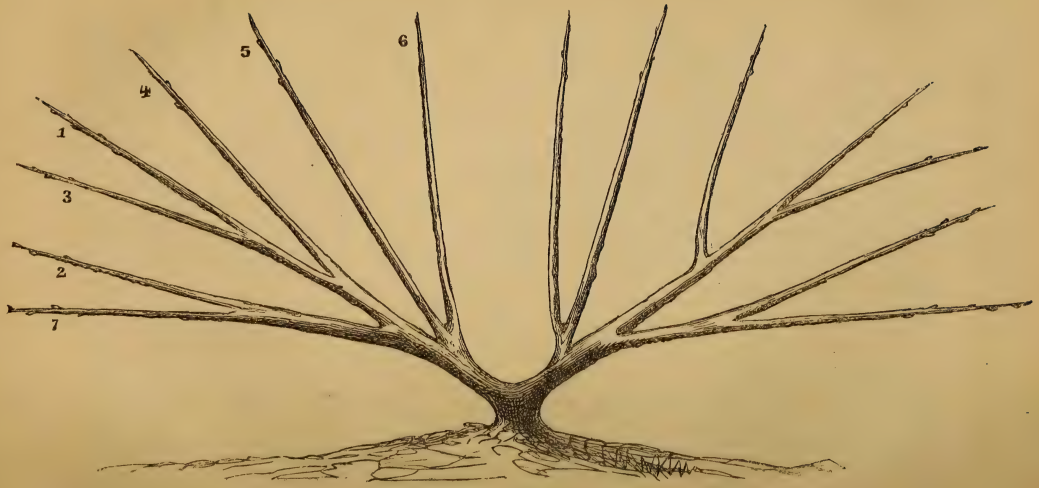

Fig. 9.—THE MONTREUIL FAN.

this there is certainly no form which equals the *espalier carré*, of which, as the same indicates, the squareness constitutes the chief advantage.

This form has, therefore, been selected as a model for walls of about 9 or 10 feet in height, where a large tree of any favourite variety was desired. At the same time it cannot be too often repeated that modern gardeners prefer smaller sized trees, and more in number. In this way a succession of crops is best secured, and a greater variety of fruits may be cultivated.

For walls of about 12 feet in height the old Montreuil fan is extremely well adapted. It is a symmetrical shape, easy to establish, and durable. In both of these old and well-known forms it will be seen, that the sap has been directed into two main channels, from the commencement of the formation of the trees. These channels remain to the last as the main arteries of the whole system. Their position, at the most favourable angle, and their early formation cause, as Lepère truly remarks, the sap to acquire "the habit of using them in preference," while their larger proportions secure a more abundant flow. Kept carefully balanced, by the usual means, during the first five or six years, they continue as the guiding principles of either wing. Their importance and use are aptly explained by their French name, "mother branches,"

and in each of these forms they are marked 1, in our engravings.

The *espalier carré*, and Montreuil fan, are neither of them difficult to acquire. Their harmonious proportions are far more pleasing, even when without foliage, than the ordinary irregular fan shapes. It is surprising that these irregular shapes should still be recommended in works on this subject. The reason given is that the vicissitudes of the English climate require irregular forms, as being those most easily remedied when injured. But it would seldom happen that either of the leading branches in the *espalier carré* could be irretrievably injured, while in the case of the Montreuil fan, it would suffice to lower the branch immediately above the injured portion into the blank space, allowing a new shoot to grow from its upper side to fill up its old place. For these and other reasons these two forms are here selected as models for long pruning. Other forms will occur when close pruning is treated of. Those with a main central stem from which lateral branches are developed yearly, are of obvious formation. In them the lowest branches should be carefully established from the first, as these generally languish in the course of time.

The Old Montreuil Fan.

In the first year the leading branch (marked 1) of either wing is developed, and carefully balanced by the usual means (described in No. 7, Section 2). Both of these leading branches are shortened to about 12 inches at the first winter pruning, and during the course of the second season of growth, the secondary branch (marked 2) of either wing is developed. At the winter pruning, the leaders (1) are shortened in again, but considerably less (unless bare), while the secondaries (2) are encouraged to extend more freely. During the third season of growth, another secondary (marked 3), and a tertiary (marked 7) in either wing, are simultaneously produced. The winter shortenings of all these branches are now still less. During the fourth year, all these existing branches are simply maintained in equilibrium, in order to remedy any defects before proceeding further. In the meantime, the shoots on all these branches have been carefully stopped, so as to equalise still more the tree, and to make them fruitful. A little fruit has by this time been taken, but not much. Another object is to allow the tree to gather strength, and to habituate the sap to these channels, before proceeding to form the upper portions, which, being

more vertical, are more liable to become too strong.

In the ensuing, or fifth season, the two secondaries (4 and 5), of either wing are now developed simultaneously. During the sixth year, the whole form is maintained in equilibrium, and the tree has now become productive, and vigorous, while the branches require much less shortening. In the seventh season, the tertiary (6), of either wing is developed, which completes this beautiful, and simple form. After this nothing is needed but to keep the shoots close, and healthy. The weak points are at the angles of insertion of the secondaries, where the shoots are more apt to be crowded than in the *espalier carré;* but this is a defect inevitable in any form partaking of this character, as is seen in the case of Seymour's training, and other modes.

The Espalier Carré.

The leading branches (marked 1), of either wing, are first developed, and treated as in the case of the Montreuil fan. The second year the first lower secondary (marked 2), of either wing, is produced. In the third year, the second lower secondary (3), and in the fourth year, the third lower secondary (4), of either wing, are established.

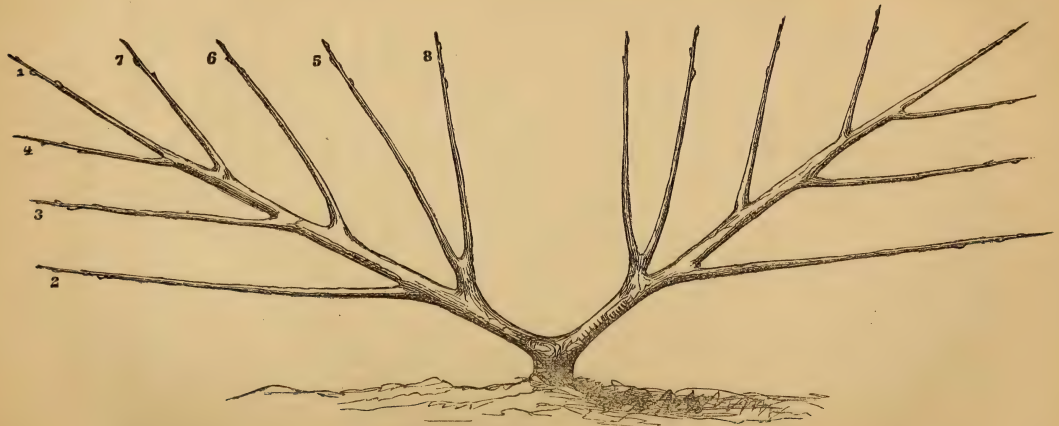

Fig.. 10.—THE ESPALIER CARRÉ.

The fifth season is devoted to equalising the whole form. In the fifth, sixth, and seventh years the three upper secondaries are developed, and the upright tertiary (8), of either wing, being also laid in, the form is complete. The branches are shortened less at every ensuing winter pruning, and the fruit-shoots carefully stopped from the second year.

The weak points of this fine old form are the rather large interval between the extremities of the secondary branches, amounting to 3 feet. In close pruning, with the shoots more shortened-in, much wall-space would be wasted, therefore the *espalier carré* (unless with a greater number of secondary branches), would not be so suitable. But, on the other hand, the angles made by the insertion of the secondaries on the leading branches are open, and afford much scope for furnishing these difficult portions of the tree. The largest tree at present in the Lepère gardens extends over 40 feet of wall, and one eight years old and just complete, measures 30 feet in width. These are trees of free-growing varieties, such as Grosse Mignonne, &c., and superbly cropped.

Good specimens of waved forms may be seen in England and France. In this case it is proper to divide the tree into two wings, though with a waved central main stem there is little danger of the tree being out of balance. In either of these

cases the interval between the branches which are laid horizontally, should be about 2 feet. In short, excessive shortening of the branches should be avoided; all vertical lines should be left till the last to be established, and, for the first years, little fruit should be expected. When once the tree is well formed the branches may be left untouched, and the shoots being carefully attended to, the tree will bear and grow. In irregular fans with central stems, the fruit is comparatively valueless in the lower branches, which languish as the sap is attracted to the upper branches, while the whole centre of the tree is apt to become bare and exposed for the same reason.

No. 11.—Theory of Long Pruning.

The object of all pruning is not to increase the vigour of the entire tree, but to control and modify that vigour, and so accelerate and regulate the fruiting period. Pruning, conjointly with appropriate training, claims to be able to add to the longevity of fruit trees. This is effected by balancing the separate parts. More than this ought not to be expected from any system of pruning. This, to be successful, must be based on an accurate knowledge of the habits of each kind, which knowledge is the result of observation and expe-

rience. It is here that the recorded opinions of men eminent in their profession are valuable; for, though the Peach tree adapts itself to many varying conditions of culture, there are certain principles which should be ever kept in mind.

Those who have seen the Peach-orchards of the south of Europe, and of America, know how little care is generally bestowed on them beyond manuring the roots. In these favourable climates standards three years old are laden with fruit. They bear thus, exhaust themselves, and decay, without more than a casual attention being paid to them. This is culture reduced to its simplest elements; but even in such cases experience has shown the value of some kind of pruning. This, according to Downing, consists in cutting out one-half of the shoots of last year's growth. The crop is diminished by one-half, but the size of the remainder is doubled. In the more northern States espalier training is in vogue, requiring far more care. The attention paid to Peach culture in northern and mid-France equals that required in England. Superb fruit is grown in America in nearly every part, but in France only where scientific training is employed; for the standard-grown Peaches of the southern districts are valueless. In England, therefore, it is useless to expect success without labour and skill, and foreigners do

well to admire the great results produced under such difficult conditions.

No one can now reasonably doubt the immense boon which the introduction of orchard-houses has been to lovers of the Peach. We who are conversant with the best productions of foreign climates, know that fruit grown in well-managed orchard-houses is literally unequalled; but to do this is not in the power of every one. To simplify, then, as much as possible the process of learning must be our object; and no system, however sound, can be really useful if it be complicated. For this reason alone more than one excellent teacher has failed.

Peach culture is not really difficult to practise; it may become so by injudicious treatment. When we read the works of the best writers on this subject, we cannot fail to see how simple the whole process seemed to be to the minds of some of them. In several the whole instruction for the summer and winter is contained in a dozen lines. To keep the roots well drained, to lay in a good supply of bearing wood, to remove that which had fruited, and not to shorten-in too much, were almost the only injunctions given. No indications were thought necessary by which the amateur could distinguish the various classes of shoots; some vague and general directions as to dis-

budding were added. It is evident that instructions of this brief and general nature presupposed a larger acquaintance with the subject than usually occurs with amateurs, and, being unaccompanied by illustrations, they, though written by first-class growers, failed to teach much. On the other hand, in such a plain matter as pruning the Peach, it is really absurd to attempt to teach it by elaborate and complicated rules. Much of the present style is of this kind (especially on the Continent), and on this account will never be acceptable to English gardeners. The excessively long pruning practised in the days of our fathers was, however, almost as pedantic, and as strange to read of now. Here we find the traditional "good supply of young shoots, and thinning out the old and unproductive ones as soon as they appear naked," &c. Then comes the direction to lay in the "shoots of medium size, and full of flower-buds, at full length, from two to three inches apart." "All forerights and supernumeraries to be rubbed off during the summer months, as soon as they have reached an inch in length." In this case no cluster-spurs could be retained; and it is evident that, there being no mention of disbudding in this case, the long shoots, laid in closely, must have crowded the tree, and caused much overgrowth. What the tree must have looked like at the winter pruning it is im-

possible to say. Other later writers of eminence recommend the shoots to be shortened to fourteen inches if strong, and weak shoots to about six. At Montreuil about twelve inches in general is the rule as to length of shoot.

The unnatural and needless system of disbudding seems to have many advocates in the authors before us. Indeed, with one author, it constitutes the chief part of his recommendations. To lay in a shoot (the length not stated), but evidently at its fullest extent, and to disbud it in three times—(there is great stress laid upon this number)—to leave only the terminal bud, and one at the base—(for a replacing shoot)—and to allow one or more Peaches to grow on the naked shoot between them, is really the whole that is stated. Another writer considers disbudding a "most important consideration." It will, however, be seen that later practice prefers the judicious summer-stopping of the shoot, whereby the same result is obtainable by more simple and natural means.

The result of such a style of long pruning almost always is, that far more wood is grown than is wanted. The tree exhausts itself, especially in our humid climate, in the production of long unripened shoots, and the pruner, at the winter season, sees before him three times as much wood as he requires for fruiting. If he be one of the

traditional school, opposed to every change, he proceeds to cut out, perhaps, two-thirds of the superfluous shoots, thereby rendering the tree liable to canker, and he has no choice left but to preserve the remainder, which, from the confusion and crowding of the past summer, are often unfit to bear. This may be an extreme case, but whenever a sunless summer occurs any similar system must fail. "The cautions," says McEwen, "given as to laying-in reserve shoots have done much injury; the vast amount of unnecessary wood laid in prevents the proper expansion of the leaves, or the action of the sun on the walls. Reserved shoots are only 'reserved' to be cut out, and green shoots, soft at the core, are the result, and a prey to a thousand diseases. This is smothering the tree with superfluous wood." And to the same purpose his Editor—"Over-cropping with wood is as injurious as over-cropping with fruit; both shorten the existence of trees." Much more might be added, but it is needless. In short it may be taken as certain that the system of long pruning tends to produce too much wood; that such wood is not fruitful, not having had its due share of our capricious sunshine; that the amputations of shoots and branches, rendered necessary for a "fresh supply," are dangerous in the extreme, and that the trees are extremely liable to become bare at

the centre. If to this be added the injudicious forms of trees, and undrained borders, every failure seems easy of explanation.

It remains to suggest some remedy. All late experience tends in one direction—closer pruning. The results which have been obtained in the orchard-house, under very close pruning, serve to show that this system, when modified so as to suit the exigencies of the open air, contains within it the germ of a new style. Could this be made to suit, both for trees under glass and for those on the open wall, no doubt a great step would thereby be made towards uniformity and simplicity. Ten years of experiments made on trees in the open air have shown that this is possible.

"The Modern Peach Pruner" does not favour long pruning, but as, when properly practised, it may be rendered sufficiently successful, the ensuing chapter will contain what is considered the best method of so doing. The remaining chapters will be devoted to close pruning, and especially to describing an entirely new system of managing Peach trees on the open wall.

No. 12.—Long Pruning.

There are various methods of pruning the Peach which can be classed under the head of "long;"

but it is unnecessary here to illustrate more than one, which may be taken as a good specimen of this method. It is not more complicated in practice than the others, which are founded on the annual supply of young branches.

In this method the shoots spring from spurs which are calculated to last several years, and which are renewed whenever a new shoot springs conveniently from the base of the spur. A good succession of young wood is obtainable in this way.

All modern experience tends to show that systems founded on any considerable annual cutting-out of branches, however small those branches, must end in causing disease in the Peach tree. There is not, in reality, any good reason for this dangerous practice, which has already caused so much loss; far from this, the day seems at hand when leading branches will not be shortened at all, and the chief pruning of the tree will be effected by the summer-stopping of the shoots, allowing a comparatively small amount of regulation for the winter season.

When these ideas are fully carried out, the difficulty of Peach pruning will become small, and theory and practice will agree more fully together.

It is necessary now to go back a little, and remember that our young tree is supposed to have made a certain growth, during the summer next

after its being planted. Many pruners, at the winter season, shorten this growth made by the leading branches by one-third; the reason they give is, that the lowest third part of each branch frequently fails to develope its buds. This is, however, but a visionary fear, if the roots do their duty.

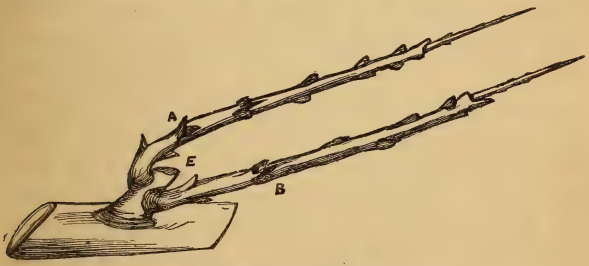

Fig. 11.—THIRD SUMMER PRUNING.

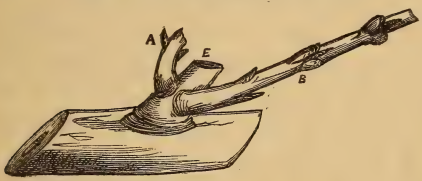

Fig. 12.—WINTER PRUNING

The next summer all the branches will extend freely, and the buds upon them will begin to develope themselves. The buds situated on the lowest third portion of each leading branch not receiving,

especially if placed on the under side, much sap, will generally not extend much, and if the season be very favourable, some will become converted into cluster-spurs (class 5). These must, therefore, be retained untouched. Their character is discernible by May. Should they extend more freely they will pass out of class 5, and become rather slender shoots, and should not be stopped at all, not being in a position to become gross shoots (class 4). The buds situated on the central third portion of each branch will extend freely, and be the principal fruit-bearers of classes 2 and 3. They should be stopped at 12 inches as soon as they have made 15 inches of growth, and be lightly tied in during the season of growth, at regular intervals, and at nearly the same angle as the branch. The buds situated on the upper third portion of the branch should be treated in the same manner; and should any exhibit the appearance of becoming gross shoots, of class 4, they should be cut down at once to two eyes, from which one new shoot is to be selected (the best placed, and the weakest) to fill up the vacant place. This will be a shoot of a valueless character, long between the joints, and of class 1; but it cannot be avoided.

The extension, or new growth, of each leading branch must be allowed to develope freely. Care must be taken to guide these branches in the proper

direction, by means of light rods, and none of them should ever be lowered into the place it is destined eventually to fill, until it be well constituted, and in good balance with the corresponding branch of the other side. This is done by raising or depressing, according to circumstances. As no fruit is expected at this stage, blossom-buds may be rubbed off. Should any of the wood-buds be seen to be double, and to put forth two shoots, some little

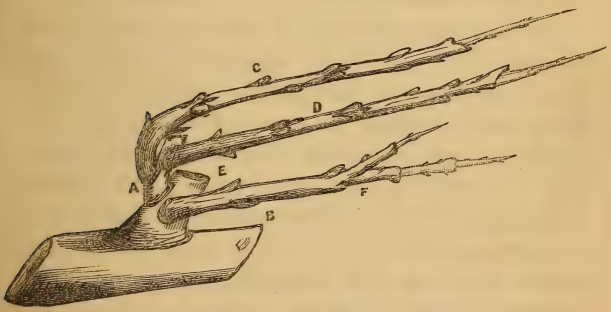

Fig. 13.—FOURTH SUMMER PRUNING.

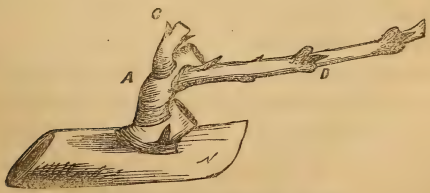

Fig. 14.—FOURTH WINTER PRUNING.

discernment may be required to select the proper one, and to do so at the right time. Passing over the shoots of the lowest third of each branch, which are not troublesome, of those placed higher up, the shoots nearest to the wall must be selected, and the outer ones removed, whether on the upper or lower sides of the branch. But, on the upper third portion, which receives abundant sap, all the weaker shoots should be selected for fruit-bearers, no matter where placed.

At the winter pruning of this the second year, should any cluster-spurs appear, one or two may be selected to bear the third season's fruit—that is, if it be so desired, because the tree it yet very young to bear. All the other shoots should now be cut back to two good eyes. The leading branches in this style of pruning are now shortened by, say, one-fifth. To shorten more would be to throw the tree into inconveniently long lateral growth, requiring much interval between the branches. Of course, this interval varies with the style of pruning. Twenty inches is considered a moderate interval.

At the spring of the ensuing, or third season, the tree will have acquired certain proportions and form, and the shoots shortened last winter to two eyes will each speedily develope two new shoots, which shoots must now be carefully attended to,

as destined to bear a moderate crop of fruit in the fourth season. We come thus to consider the branches and shoots as they appear at the third season.

The two shoots during this summer will gradually assume the appearance indicated in *fig.* 11. They are there named respectively A and B, as being the two original shoots proceeding from the spur E. If we keep to this nomenclature it will avoid confusion. No doubt the term "spur" is the most appropriate here, and has been received as such before by reviewers of "Cordon training." Spur is the correct rendering of the synonymous continental word, and it certainly is produced by manipulation. Both shoots will be allowed to extend to 15 inches, and be stopped back to about 12 inches. At Montreuil about 14 inches is the general rule.

Many pruners abjure summer-stopping altogether, which is a great error, and the cause of overgrowth and weakness in the tree. The winter shortening is immense and needless, because it is well known that the buds of the lower portion of each shoot can be readily distinguished in June, and a good guess then made as to their quality. If the lower buds be then prominent, and well established, what need can there be for any superfluous length of shoot beyond them? But, let us

suppose A and B to make a good summer growth, and to have been stopped at 12 inches, as seen in *fig.* 11, and then to have made an additional second growth, which is only of use so far as it occupies the superabundant sap. During the season they will have been secured to the wall, avoiding enclosing any leaves, at the proper angle, and if weak it is proper to raise them somewhat more. At the winter pruning, when the leaves have dropped, they will look much like *fig.* 11. E represents the original shoot, now called a spur.

It will now be proper to consider which shoot should be preserved long for fruit, and which cut back for a replacing shoot. In *fig.* 12 it is supposed that B has been found, by reason of its groups of triple buds, to be the best, and therefore it is cut down to above the second group of triple buds. Many pruners, however, would have left it half as long again. Some retain thereby space for a couple of fruit. This may be done when there is generally little fruit on the tree, or if the tree have few shoots. A is cut down to two good wood-buds for a succession; the long shoot B is attached closely to the wall at rather an acute angle with the branch. The spur E continues to preserve its original form. These simple operations complete the year's work; great care having been taken, by syringing copiously, &c., the leaves during the

summer, so as to keep down insects and favour growth. Practical Peach-pruners, such as Mr. Radclyffe, continually tell us this.

At the fourth summer, in *fig.* 13 we see that the original shoots A and B are still the basis of the work in hand. A from its two wood-buds puts forth two summer shoots C and D, which are likewise stopped at 12 inches, and make a second growth. B now bears a fruit at F, and the wood-bud accompanying the fruit extends a little, and is pinched in at three or four leaves. The terminal group sends forth another shoot from its central bud, and this is also pinched to three leaves. These two small shoots are amply sufficient to attract sap to the fruit below them, and this is their use. It will be observed that the fruit grows in this case on the lowest triple group, which is always the best to select. Should the shoot B have been laid in at much greater length than here shown, and disbudding the intervening buds be practised (as so many do, some leaving only the bud accompanying the fruit, and another at the base to suceeed), then it can only be considered an unnatural and useless custom. Moreover, some of the very best practical pruners agree, that it is not proper to depend on the same shoot to bear fruit, and to produce a replacing-shoot for the next season. It cannot be depended on, and requires far more attention in

bending the shoot at just the proper time than the present plan. If this bending down of the shoot is omitted it will be blind the following year. The new shoots C and D are treated as before described, and if neatly secured to the wall will not present any confused or crowded appearance.

At the fourth winter pruning either of the shoots C and D are selected, according to their character. Supposing D, the lower shoot, to be selected as the fruit-bearer, it is cut above the second or third group of buds as before; C, the upper shoot, then becomes that destined to produce the two new succession-shoots, and is accordingly cut back to two wood-buds. The upper portion of the original spur E, together with the whole of the shoot B, are now cut away as smoothly as possible, leaving the whole as it appears in *fig.* 14. By this time one or more buds will have appeared at the base of the original spur E, and these if developed will form the basis of future work. Should several appear, one at least should be closely pinched in, so as to form a cluster-spur, and thereby increase the chance of fruit.

There are several other ways of managing the shoots, but none better than this one, nor in reality more simple. Some manage to work with alternate shoots. Others dispense even with this, and are content with single ones. Much overlying of

shoot and branch and considerable winter amputations are the consequences. Long pruning, on the whole, wastes the vitality of the tree by producing much needless wood. All recent experience points to a modification of this system, which shall form my next subject.

No. 13.—Theory of Close Pruning.

The history of this part of our subject is somewhat obscure, and, though interesting in itself, a brief notice will suffice. The present style is, no doubt, only a revival of what had been touched upon by Keith in this country, and De La Quintinie in France, nearly at the same time—that is about 150 years ago. For a certain period no progress seems to have been made, though the matter was freely discussed in both countries. We may, therefore, take the late Mr. Knight, a very competent authority, as a fair exponent of closer pruning in more recent times. The passage is quoted by McIntosh, and is as follows:—"Instead of taking off so large a portion of the young shoots, and training-in a few only to a considerable length, as is usually done, as I should myself do in every favourable situation, I preserve a large number of young shoots which are emitted in the early spring by the yearling wood, shortening each where

necessary by pinching off the succulent points, generally to the length of two or three inches. Spurs, which lie close to the wall, are thus made, upon which numerous blossom-buds form very early in the ensuing summer; and upon which, after most unfavourable seasons, and in situations so high and cold, that the Peach tree in the most favourable seasons had usually produced only a few feeble blossoms, I observed as strong and vigorous blossoms as I usually have seen in the best situations and seasons, and I am quite confident that had the Peach trees in gardens round the metropolis been pruned in the manner above described—that is, upon spurs, in the last season—abundant and vigorous blossoms would have appeared in the spring."

Mr. Knight then proceeds to recommend a mixed system of long and close pruning, which, when judiciously carried out, is very successful. It indeed requires some experience in the selection of the proper class of shoot. Mr. Knight seems to be disposed, however, not to trust the whole crop on spurs formed by close summer pruning. In "warm situations," the ordinary long pruning, he says, may answer; but "in cold and late situations then try the spur method. A mixture of both modes, in every situation, will generally be found to multiply the chances of success, and,

therefore, neither ought to be exclusively adopted nor rejected in any situation." This is sound and practical counsel, and comes from an excellent authority; and McIntosh, alluding to these remarks, says of them, that they are "well worthy of the attention of Peach-growers in all situations, even in favourable localities, but especially so in cold and late ones."

Since these opinions were published, Peach-pruning has considerably advanced, and it is not too much to assert that orchard-houses have revolutionised the whole system. A similar change seems to be imminent in France and elsewhere.

In France, especially, close pruning has, at present, numerous advocates. Though, as we have seen, this system is only a revival, there is no doubt that the Imperial Society of Horticulture of France is justified, in its report of 1862, in speaking as follows:—"We must leave to M. Grin, of Chartres, the honour of having at least popularised the original idea; a fact which has the real merit of a veritable initiative." Speaking of close pruning, Professor Dubreuil says—"I saw in M. Grin's gardens such excellent results from this method, that I hesitate not at present to recommend it to the exclusion of every other." In Professor Gressent's late work (which has the sanction of the Minister of Agriculture and Commerce), it

is stated that M. Grin, being convinced of the many disadvantages resulting from the old system of long pruning, applied himself for a lifetime to work out a newer and more profitable way, and finished by obtaining a complete success. The shoots, he says, being so short, the branches may be double in number, and each of the closely-pinched-in shoots bears at least as many Peaches as the *coursonnes de Montreuil*. Professor Gressent then adds, that the complete success which attended M. Grin's labours, caused him much envy and resistance in his native country, but that having, like M. Dubreuil, visited Chartres, he was so convinced of the advantages of the new style, that he has ever since adopted it. In his work of 1863 he describes it, and says that he has followed it on a very large scale, and introduced some important modifications, which, being similar to some tried in my own garden, shall be noticed presently.

M. Grin has laboured under some disadvantage in having his ideas first presented to the world in the works of others. Though fairly enough described, the actual experience gained is not represented, nor his latest ideas, and it is with a certain pleasure that I am able to state, that these lines are the only authorised exposition of the whole system in its latest development, and that by them alone the originator wishes English

gardeners to learn it. Having myself followed the system for ten years, with some success, on the open wall (the first occasion on any scale in which it has been thus tried in this country), and having applied it to the back wall of an orchard-house, with diagonal cordons (also a novelty, as described in a former work), a certain experience has been gained not without value.

On the practical advantages to be derived from close pruning, M. Grin thus speaks—"Whatever form may be selected for the trees (his were horizontal cordons with a single central stem, and single diagonal cordons), first establish well your principal branches. On these, by close pruning to two leaves, short spurs are formed which bear fruits of equal size in every part of the tree year after year. It is true that M. Lepère, by a different system (long pruning), produces good crops, but nine out of ten fail because they do not possess the constant practice and special science required for such a style of pruning. Some eight or ten successive operations are required in long pruning, all requiring an exact appreciation, which does not belong to the generality of gardeners. On the other hand, close pruning has the immense advantages of simplicity and economy of time and money. There are no tedious tyings-in of the summer or winter wood. The main branches are

only ten inches apart (and here let me observe that six inches would be better), therefore, without a given amount of wall space we can obtain a double amount of crop. Lastly, there are few or no amputations of important branches, and this alone constitutes an appreciable gain, even to suppress 'gourmands' (gross shoots of class 4), or to shorten extensions where needed. Every amputation, however well performed, causes a perturbation in the economy of the tree. Why not anticipate the causes which necessitate amputations, rather than have the merit of curing them? Besides this, even clever gardeners cannot always succeed in remedying the evil effects of wounds on the tree."

The above are the chief reasons given by M. Grin for adopting very close pruning or summer-stopping of the shoots. In fact there seems no reason whatever why a well-furnished main branch should ever be shortened at all. If the shoots are kept regularly and closely summer-pruned, the prolongations of the branches may, with the exception of equalising them, be left to themselves. How simple would Peach-pruning become under these new forms! Plant the tree carefully in a well-chosen and well-drained spot, allow it to grow, only balancing it, keep the summer wood short, thin out in winter a little;

this, with shelter and destroying insects, &c., is really all.

We thus perceive how really simple and easy to perform Peach-pruning is. Good pruning should not differ much in principle, whether in the open air, or under glass. In either case, if we take care of the shoots, the branches will take care of themselves. The exigencies of space, of course, require that we should direct the growths in the most convenient manner; but a branch, 20 feet long in the open air, can be made to form a compact spiral cordon, occupying little space, round three vertical wires, and no style of training is more beautiful or more productive.

To the above cited well-known names, which are now connected with the success of close pruning, I may add that of Mr. Rivers. Orchard-houses have, indeed, done much for the Peach. Their multiplication induced corresponding developments in training. The great object was, of course, to economise the valuable space, and to do this close pruning was required; and, in consequence, we find the principles of close pruning well described in Mr. Rivers's works on the management of these houses. There need, therefore, be little doubt as to the solidity of the foundation of these truths. As was stated at first, the chief object of these papers was to point out

the utility of a system which should serve, with obvious changes, both for the house and for the open wall, and each succeeding season has proved that this is possible.

No. 14.—The Premature Lateral.

As some of the most successful growers have devoted considerable attention to the proper treatment of this summer lateral (*anticipé* of the French), it would be improper here to pass it over; and, indeed, it constitutes a certain basis in very close or in-door pruning whereon to establish much after work. In the open air it is also important, as helping much to keep the fruit nearer to the wall, and closer to the main branch when properly treated. The premature lateral springs directly from the wood of the year, whenever that wood is of a certain strength. The gross shoot (class 4), with these summer laterals springing from it, has been already depicted. As an extension of a young and healthy tree it frequently attains a considerable size, and, provided due attention could be given to directing and controlling its growth, we should be glad to see it; but the laterals which spring from it, when so placed as to receive a great volume of ascending sap, are apt to be troublesome to manage. The *bourgeon anticipé* is naïvely called

by M. Grin "the enemy of gardeners, and is either of a good or of an evil nature." In the first case it is known by the principal leaf being considerably longer and broader than the others. This is when it is quite young and manageable, for it very soon becomes vigorous, and is then easily recognised by its erect habit and darker colour.

During the months of June and July, especially after a favourable May, the growth of the Peach is considerable. The tree requires constant attention and regulation of the summer shoots, for upon the exact performance of this depends the future appearance of the tree; but the growth of summer laterals, when placed on the upper side of the extension, is such, that it is not easy to regulate it. The consequence of a neglect is, that the strong flow of sap will develope these laterals so fast as to carry away the first pair of well-formed leaves to a distance of 2 or 3 inches from the base in a very short time. This is evidently a defect, and if it should occur in many places must cause the loss of valuable space, and also of radiation of heat. On the other hand, to arrest unskilfully the growth of these laterals in a young and vigorous tree must check its progress and injure it. In the case of an established tree, to remove too great a portion of the laterals on the under side of an extension, may

end in their drying up entirely by the end of the season.

It requires, therefore, both experience and attention to transform these laterals into close-lying and at the same time vigorous spurs for future bearing and growth. The general habit of the tree operated on must also be carefully considered. Some sorts of Peaches and Nectarines are naturally of weak growth, and such should not be severely treated, but be allowed more freedom of growth, and to become well established before bearing regularly. Indeed the skill and attention required to manage successfully these laterals are such that Professor Dubreuil says, "This is the only portion

Fig. 15.—CHECKING PREMATURE LATERAL.

of M. Grin's method which really presents any difficulty."

The object which we have in view is to avoid a blank space of more than an inch between the first pair of full-sized leaves (which have the bearing-buds with them), and the base of the laterals, for the reasons before stated. Passing over other expedients to check the growth of a too-vigorous lateral on the upper side of an extension, M. Grin's method may be recommended here. It consists in the suppression of one-third of the two small leaves which spring immediately from the base of the larger leaf. In *fig.* 15 these small leaves are marked A, and the line of suppression is shown by B. This operation is considered to be always successful provided—and here is the only difficulty—it be done at the proper moment. This is known by the relative sizes of the leaves as seen in the engraving. There is no doubt that in the case of an orchard-house cordon, which is more easy to watch, the sudden arresting of the sap will produce two or more buds, which will constitute a good basis for next year's work.

Should, however, the lateral have made its growth unchecked, and have carried off in its progress the leaves and buds to a distance of several inches, we may be induced to try Professor Gressent's remedy, which he highly recommends, for it

is easy to perform, and the defect in our tree is conspicuous. The object in this instance is to cause the production of a cluster-shoot or spur ("May cluster") at the base of the offending lateral. He proceeds in the following manner. By means of a sharp-pointed instrument or lancet he pierces the base of the already-developed lateral and the dormant bud near it, so as to produce a deviation of the vessels of the medullary canal, without, however, injuring the ligneous formation. The vessels being cut, a temporary concentration of the cambium is induced; a mass of cellular tissue results, and ends in the production of a group of flower-buds. By the next spring this group is well constituted, and the lateral may then be suppressed, leaving in its stead a group of buds as delineated in *fig.* 5.

In *fig.* 16, A represents the point of section; B,

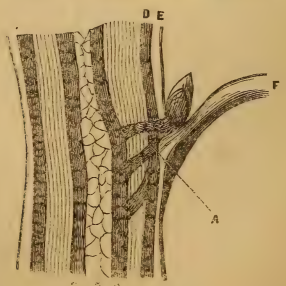

Fig. 16.—PIERCING BASE OF LATERAL.

is the medullary canal, composed of the primitive cellular tissue enclosed within the wall-like formation of the vascular tissue, C, C; D is the inner epidermis of the green shoot, through which the cambium descends; and E is the thin outer epidermis not yet become hard. The ligneous formation is seen between D and C; and F represents the blank portion of the premature lateral.

The method here described may be tried with advantage in certain cases, care being taken not to pierce beyond the point indicated.

I have thus endeavoured to point out how to recognise the character of a lateral which seems likely to become gross, and shown when and how to arrest its progress. In the next instance a remedy has been pointed out, in the case of a lateral having been neglected or overlooked. It remains, then, only to describe the treatment of such laterals as are of fair growth and promise. In the case of maiden or young trees it is good practice not to check their growth, but only to direct it a little. We shall, however, suppose the tree to be somewhat established and formed. In this case the laterals on the summer extensions may be stopped to 6 inches to strengthen the buds at the base, of which, at the winter pruning, there will be left only two good buds. When these have pushed in the following year, in order to induce them to be

fruitful, they should be stopped at four leaves as soon as they have made six full-sized ones. The second growths may be stopped at two leaves more, and the third growth may be stopped at one leaf, or allowed to extend during the autumn, according to the state of the buds at the base. If all go well, by August we may confidently expect to find the lowest two buds full and well established. Possibly another pair besides these may be developed nearer to the base of the lateral. The two upper buds will have extended, on these the second and third growths will have been already stopped respectively at two leaves, and one leaf as before said.

It is my practice in this case to allow the tree to make some more growth, unless the autumn be wet and sunless; if, however, the two lowest buds of the lateral are not satisfactory, then but very little second growth is permitted, and frequently it is good practice to cut back below the first stopping, and by a new check and concentration of the sap and diminution of the shade produced by the leaves, to endeavour to ripen these lowest buds.

Some of the finest fruit is produced in the ensuing season on the extensions. When, however, the tree bears freely, the laterals should be rather devoted to form new spurs for future use, and, if possible, they should be transformed into a group of two or three shoots.

In the case of very old trees no rules can be given, as these require less severe pruning, and vary considerably.

In *fig.* 17, we have a premature lateral drawn

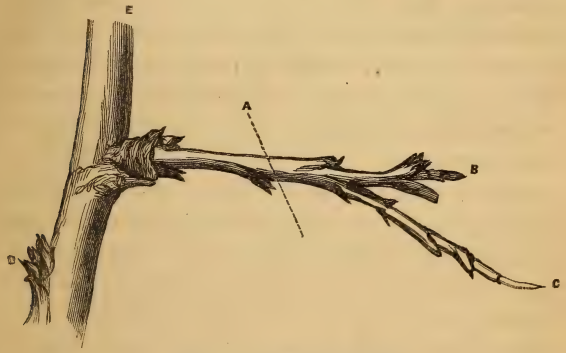

Fig. 17.—WINTER PRUNING.

by myself from nature early in August. The leaves are omitted. We notice the pair of buds at the very base of this lateral; they are prominent, dark in colour, and triple, which is not always the case. The lateral had been stopped at the fourth leaf, when it had made some six full-sized leaves, and two these four buds have extended. That marked B has been stopped at the second growth, and has formed at that point a group of flower-buds which would ripen in an orchard-house; the other bud, marked C, has also extended,

but it has not produced flower-buds. It would have grown freely, and so has been stopped at about two leaves beyond the first stopping; and, again, for the third time, at one leaf: still it is growing, and it is no matter, for our lower buds are well constituted. The tree suffered also from insects, and will benefit by more growth during the rest of the autumn. Probably M. Grin would cut back, at the winter pruning, to the first pair of buds at the base; but I have found it well to have plenty of shoots to select from. I should, therefore, cut back only to A, above the beautiful triple group there. This group having a central leaf-bud will be sure to extend. Should any fruit appear on this group it might be left on, if so desired, and the leaves beyond the fruit reduced to two or three. The pair of buds at the base may become "May clusters" by this process, which, indeed, is the principal aim of very close pruning. Nothing can be more successful than the production of this class of shoot, especially in pairs. Should, however, these buds at the base extend, they will very likely become fruit-bearers of class 2. As soon as the group at A has borne its fruit, it should be completely cut out. By this time the eyes at the base will have become strong, and will be ready to take the place, in some shape or other, of the group removed. At D, we see a group of

buds on the other side of the extension, E. This group will be of service hereafter, probably as a May cluster.

The lateral represented is a fair specimen. Others more striking could as easily have been shown; some which by stopping have forked and become double shoots, which can be left at such, and others equally useful. Of course, the double shoot is nearer perfection, provided it divide very near the base. In M. Grin's practice he does not, however, attach so much importance to having more than one shoot from the same base, but it multiplies the chance of fruit, especially in the open air.

No. 15.—Close Pruning for the Open Air.

Under this term we comprehend both the summer-stopping of the shoots, and their winter regulation.

Although the work for the winter depends entirely on the condition of the shoots after their summer growth, it is common to see them comparatively neglected during this important period; consequently, the winter pruning is made to assume an undue pre-eminence, which all modern experience tends to show to be an error. By reiterated close pruning of summer wood, the trees assume an appearance which has been termed "cordon,"

from a resemblance to a thick cord or cable. This term applies to trees in any form. Fan-shaped trees may be called *horizontal cordons*. Those planted closely together and trained at an angle of 45°, are styled *oblique* or *diagonal cordons*. Trees with any number of upright leaders are *vertical cordons*, while those winding gracefully round wires, or posts, are *spiral cordons*. All these are formed by the mode of close summer-stopping of the shoots. For trees under glass no better or more simple plan can be imagined, and our object is now to show that there exist no difficulties in the way of a similar treatment of trees in the open air. The advantages of this method are great. In the first place there is a total suppression of the summer and winter tying-in of the shoots. This alone constitutes an appreciable gain, especially during a period when we have so many claims on our time. Again, the shoots being closer-lying, they require less space between the leading branches, and thus there can be more of these.

Systematic summer-stopping of the shoots affects the two-year-old wood more than any other style, and tends to produce and maintain, in the case of the Peach, those valuable fruit-bearing spurs, which produce the finest fruit, and last several seasons without much change. In this way we greatly multiply our chances of a good crop, for if one

class of shoot is unripe, that is no reason why the shorter and closer-lying class should not be in a riper state. Indeed, close pruners of long practice will not hesitate to consider these short spurs as of first importance in the open air.

In the orchard-house, trees, several seasons old and in good bearing, soon become covered with these short fruit-bearers (classed 5 and 7), no matter what form the tree is trained under. It seems evident that if we can succeed in replacing the old long shoot by a group of several short ones, each fully as capable (to say the least) of production, that we have materially augmented our chances of a good crop. The objection usually made, that on these short spurs no well-developed leaves can be secured, is not sustained by practice. The production of healthy leaves depends far more on the state of the roots, and if these leaves are kept in a clean and healthy condition, there need be no fear of their not elaborating the sap. That the principle of close summer-pruning is sound is evident from the abundant crops produced, not only of Peaches, but also of every other fruit, even including standard Grapes; Vines trained in this way may be seen in the public gardens at Chartres. For Pears* especially in the open air,

* The interval between the branches, for Pears, is 8 inches. (M. Grin, in the *Revue Horticole*. Feb. 1866.)

trained as diagonal cordons, it is admirable. Late sorts are also best ripened in this way. It might be supposed that by repeated summer-stopping of the shoots, and their grouping on short spurs, in time some inconvenience might be felt by reason of their protruding too far from the wall. But ten seasons of trial have clearly shown me that this is not the case. In the instances where, by neglect or some other cause, these shoots have really lost the advantage of the wall heat, they have been removed, and their loss readily supplied from others better placed.

At the winter season all ill-placed shoots are thinned out, though it is evidently better not to allow them to grow irregularly during the summer. Mistakes or omissions are more easily remedied under close pruning, than under long pruning, while, in certain cases, we are not debarred from utilising any applicable part of the older system. Close pruning, in some shape, has been always known, but it is only within the last few years that it has been reduced to a system. It now includes as its advocates many of the first names in horticulture. "I accepted it with enthusiam," says one eminent man, whose work, in 1863, received the French Imperial sanction, "because it is normal, and in harmony with the laws of vegetation, and of fructification." It would be an error to suppose that

there is but one system of close pruning. That originated by M. Grin is by far the most severe in its rules. It is, perhaps, on account of this, that it has not been generally adopted, and possibly some change is necessary to meet the exigencies of our different climate. This change is all I have ventured to suggest, for our climate is not understood abroad.

Partly, also, and for similar reasons, no doubt, Professor Gressent in his very recent work, after passing the highest encomium upon M. Grin's theory, which he acknowledges as the foundation of a totally new school of pruning, recommends a modification of this system, which is very interesting. I, therefore, determined to make a trial of its merits during the present season, on trees in the open air.

The plan adopted may be stated thus:—The eyes (ripe buds) of a bearing branch are disbudded as soon as they are about to develope. In each group one (the strongest) is left on the lower side of the branch, and another (the weakest of each group) on the upper side of the branch. All these are allowed to grow freely, and when they have reached to 6 or 8 inches in length, they are stopped at 5 or 6 inches, according to the sorts operated on. It is necessary to allow every shoot to make the growth indicated—that is, at least 6 or 8 inches,

before arresting its progress. By this means the operation is not done all at one time, which might otherwise produce too abrupt a check in the circulation of the tree, and cause it to lose too much sap, thereby inducing subsequent gumming.

By the time these shoots are thus stopped they will have attained a certain woody firmness, and we may expect that some of the eyes situated at the base of the shoots will become well formed. By suspending the vegetation, and concentrating the action of the summer sap on these eyes, "either the rudiments of flower-buds or May clusters may be constituted, but no premature laterals be thrown out."

Soon after this stopping, a second growth is made from the extreme bud of the shoot. This new growth is allowed to make 8 inches of growth (this takes us to about the end of June), then, if at this time, the eyes at the base are well constituted, the second or new growth is cut back to about half way.

At the winter pruning, the shoot is cut down to the second group of triple buds from the base. The next season these groups will bear, and the effect of this winter close pruning is, that the latent buds at the insertion of the shoot develope themselves, and thus form succession shoots. That which has borne is now cut out, and a fresh short

shoot takes its place. All these operations presuppose, of course, that the buds at the base of the original shoot were sufficiently developed by the effect of the first operations described; but should they appear neither well formed nor prominent, the shoot should be cut back below the point where it was first pinched several successive times during July, so as to concentrate the sap upon the lowest buds and form them. This is the part of the method which requires the greatest amount of experience and attention. Possibly one single cutting back may suffice, but with trees of strong growth, or badly balanced, some portions might need frequent operations. In short, the object being to form and strengthen the eyes at the base of the shoot, all the attention of the pruner should be directed to attain this end.

All these operations were carefully tried this season on my own Peach trees in the open air, and no mention having been made of the necessity of tying-in the shoots (which in England, at least, would seem to be necessary), it was found that the two or three extreme buds of the shoots generally sent forth short laterals (owing, in a great measure, to their vertical position, they being untied), but that the eyes of the lower portions of the shoot were well formed. Cutting back beyond the first stopping (which stopping was done at 6 inches as

soon as 9 inches of growth were made) is a valuable plan, and very useful in regulating the growth of the whole side of the tree.

This modification of close pruning has been introduced here for the sake of completing our description of the subject, and to show that there exists more than one form of the system. It also proves the interest excited in the matter, and is suggestive in itself of further improvements. Being the very latest continental experience it is also of value.

No. 16.—Close Pruning for the Open Air.

I have now to state the original theory as broached about thirty years ago, and carried out up to the present date at Chartres. The system has been applied exclusively to trees in the open air.

In the earlier stages of growth, it is a recognised principle that the summer-stopping of the shoots and their winter regulation should be but small; consisting mainly in merely pinching off the point of the growing shoot, and especially in checking the advance of any shoot which has a tendency to become gross. In this way the tree is kept in fair balance. It is thus prepared for the work in hand, to be done only when the tree is about to bear a little.

M. Grin says that he commences them by untying all the leading branches in November. (In our climate good judges prefer October.) A selection of bearing shoots is then made. Those situated at the back of the branch are rigorously suppressed by being cut clean out. Forerights, on the other hand, are preserved. These, under this close system, never get too far from the wall's heat, and form an essential part of the bearing wood. In England they are too often cut out, which is an erroneous notion altogether. Of the other classes of shoots, those which show the best-formed eyes (ripe buds), and which have the best promise of wood-buds for succession at their base, are carefully chosen to bear the next year's crop. These shoots are then, generally, cut back to two eyes; and if the upper eye be the more developed and the stronger, it is bisected before it attains any length, and is thus arrested for a time. Meanwhile the lower and the more feebly-constituted eye receives all the spring sap, and is prevented from languishing. The wood-shoots which spring from each spur—and here it is important to mark the distinction made on the Continent between a spur and a shoot, and also to state that the term "spur" refers mainly to the product of manipulation—are kept as a reserve to be transformed, by close summer-pinching to two leaves, into fruit-

bearers, as required. On the spurs situated on the upper sides of each leading branch, one shoot will suffice to bear the next season's crop; but on the spurs situated on the lower sides of the leading branches, it is better to leave two shoots. All these shoots are now cut back to two good eyes. This constitutes the general winter pruning.

The first summer operations commence in the middle of April, in ordinary seasons; or in the beginning of May, in backward years. At this time the number of shoots to be left is finally settled. As they develope themselves their true character is best seen, and our author has taken care to have an abundant reserve, which is one excellent result of all close pruning—plenty to choose from, but no useless growth. Some of the shoots vary much in character. "Here, for instance," said our author to me, "we have a shoot with only a *bouquet de mai* (cluster spur, Class 5) at its base, while all the shoot above this cluster is bare for, perhaps, two inches." We therefore prefer to cut down the shoot to this single cluster, and we know how to make it either bear a wood-shoot or fruit. If the former is decided on, we shall have to bisect all the flower-buds, and then the central wood-bud will extend freely, which it otherwise would not do. (Here we find bisecting recommended instead of the too common plan of dis-

budding. This is a useful hint to orchard-house pruners who desire beauty of arrangement.) Should a shoot have two of these clusters at its base, then it may be cut down to them very closely. It then presents an excellent basis for the summer work for one of these clusters may have its flower-buds bisected to allow the central wood-bud to extend, and the other cluster may be permitted to bear fruit. (Besides, it generally occurs that, by this close keeping-in of these groups, the latent buds at the point of insertion on the parent branch develope during the summer heat, and thus form an excellent reserve. Let us also remark the dependance placed on shoots of Classes 5 and 7 for fruit-bearing. This ought, at least, to teach us, that in the orchard-house, with our climate comparatively at command, these two classes can be safely relied on to bear the general crop. Such, at least, is my own experience, and on my old trees hardly anything but these classes appear. This is the end and the result of close pruning.) If at the base of a spur the buds seem unusually latent, and it is difficult to develope them after one season, some even asserting it never to happen, then the shoot of the year which springs from that spur is shortened-in to one good group of triple buds; and at the first May stopping, whatever appearance of fruit there may then be is carefully

suppressed, and the central wood-bud of this group is allowed to extend. Thus a new shoot is obtained, not so well placed as the others, but still near enough to produce.

The general run of shoots may be said to be pinched-in to two well-developed leaves. The two or three small leaves which are seen lower down on the shoot, having no buds in their axils, do not count. This first pinching-in to two leaves generally takes place in May, the time being regulated, however, by the season and the locality, and is done as soon as the shoots have made about four inches of growth. The second pinching takes place as soon as the second growth, which springs from the axils of the two leaves first operated on, is about two inches in length, and is described by writers treating of M. Grin's system, as leaving untouched the first leaf, or even the first pair of leaves when they spring together, of the second growth—that is to say, that the second pinching is to one more leaf. M. Grin, however, repudiates this plan; and expressly states, that he has made many trials, and that if even one leaf be left at the second pinching, the second growth being vertical, and made at the moment of the strongest summer sap, its strength is such that a strong shoot is the result, which prejudices the development and maturity of next year's crop.

"These severe operations have for object to suspend, for a time at least, the vegetation of the latent eyes, and to hinder their becoming wood-shoots. Thus, during a certain time, the whole action of the sap is directed to the nourishment of the eyes at the base of the spur, so as to strengthen them, and to produce cluster spurs in the following season." It is also clear that this very close second pinching leaves little scope for the production of a third growth, also described by the writers in question as requiring a fresh pinching-back to one* leaf more.

Be this as it may, my present object is rather to show how essentially different this, the original theory, was, and has ever continued to be, from the old-established forms of long pruning. It is a little revolution of itself, has attracted much attention, and is gaining ground daily. Not only in the case of Peach trees, but to other fruits and vegetables is it applicable. For orchard-houses there can be no system equal to it. Carried out with a due regard to locality and other circumstances, it must prevail eventually and supersede all others.

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* Since the above was written, M. Grin, in the *Revue Horticole* of February, 1866, says, "By the pinching of the two small leaves of the nascent shoot (see figure 15), I obtain two leaf-buds at the base, and besides this, fruit-buds at the second pair of leaves. This is the basis of all good culture."

What has been stated in this article comprehends the latest development of this system, now a generation old, and always advancing without having much to retract. As was said before, the author desired it to be known at present in this form, and some ten years of personal trial have convinced me that it is sound and practical. All that I should, therefore, venture to suggest would be a modified form suited to the wants of our climate, which will be the subject of my next communication.

No. 17.—Close Pruning by Alternate Shoots.

It is probable that the severity of the original form of close pruning of the Peach in the open air, has presented some obstacle to its general adoption—at least in this country; and it must be allowed that what is suitable for trees luxuriating in the brilliant sunshine of France, and comparatively uninjured by the adverse influences of damp and fog, cannot, without the necessary modifications suggested by personal experience, be expected at once to secure popularity here. To obtain public confidence it is necessary that any new system practised abroad, under such different conditions, should also successfully pass through the test of a fair trial at home. Its merits can then be

Fig. 18.—PRUNING BY ALTERNATE SHOOTS.—SUMMER.

proved, and reported on; and the general public, having neither time nor inclination to examine for itself, can securely receive this report on the good faith of those who are able and willing to attempt it. It is not always, it is true, that the time, the labour, and the money spent in such trials are repaid, but in any case the public is the gainer. In examining, then, the merits of the original system of close pruning, it may not be out of place again to repeat, that at least ten seasons were devoted to giving it a fair trial, and to modifying it. During this period it was taught by me to others, who largely adopted it, and whose gardens and orchard-houses (in some cases of no small importance) sufficiently attest to the completeness and success of the method.

In considering the original system, we notice, at the outset, that the first growth of the year is stopped, in the ordinary run of shoots, at two full-sized leaves. The result always is, that the buds in the axils of these two leaves burst into a rapid second growth, which is as suddenly closely suppressed, and it follows that all the fruit-buds, and also the few intermingled wood-buds, are formed at the point of junction of these two growths.

Though valuable groups are thus produced, which, in the dry, sunny, and manageable climate of the orchard-house are just what we require, still

it may fairly be questioned whether the general vigour, and necessary progress of the entire tree may not be prejudiced by this restraint placed on them. In a semi-tropical sunshine, with a dry and ripening autumn, and planted in a rich soil, Peach-trees would certainly thrive under this very close treatment; but in our uncertain, damp, and comparatively sunless atmosphere, the balance between the roots and leaves might become unequal. It must not, also, be forgotten, that one chief aim of M. Grin's system is to produce those two-year-old clusters (class 5), which are known to bear the finest fruit. When, therefore, several of these valuable groups are formed at the base of the spur, the upper growths become of secondary importance. This is essentially orchard-house pruning, but it does not admit of that scope and largeness of treatment which is required for open-air work, especially in England.

For similar reasons, after many experiments, I think that pruning to three leaves as soon as six are formed (which style I advocated in "Cordon Training," published five years ago), although an admirable system for trees under glass, is not, on the whole, sufficiently long to meet all the accidents and risks that the Peach has to undergo.

Pruning to six or eight leaves, provided care was taken to insure the early formation of the fruit-

buds on the lowest portions of the shoot, by cutting back below the point of the first stopping in time, as described in No. 15, is a valuable system for some localities; forerights to be closely pinched in, and short spurs preserved. This is a mixed system; but I have now no doubt that the safest, the most profitable, and the simplest way is to make the first summer-stopping of the shoots at four leaves, as soon as at least six full-sized leaves are developed. These four good leaves will each have a bud or buds in their axils, and there is now length enough in this shoot to satisfy any pruner; for if these four buds are not to bear, where does the long-pruner expect his fruit to be? And if they are to bear, what need is there for more growth beyond them than is sufficient, as in the Vine, to nourish the fruit?

The first stopping of the shoots, then, is at four full-sized leaves. The smaller leaves at the base, having no buds now in their axils, do not count. Of the four leaves left, some of the upper buds will burst into second growths, and the lower ones will be constituted. These shoots not being tied in, we may suppose that one or two of the upper buds will thus burst. If the shoot be on the under side of the branch, or on the upper side and tied in, only the point-bud will burst. As soon as the second growth has made four leaves, it should be reduced to

two. If, by the time this second stopping to two leaves takes place, the lowest buds on the shoot, having had most of the sap, appear full, prominent, and formed (which one or two seasons' experience will enable any one to be a judge of), then let the third growth be reduced to one leaf as soon as two appear; and any further autumnal growth may be allowed to make several more inches, according as it is desired to strengthen the tree, after any casualty. If, on the other hand, at the time of regulating the second growth, the pruner's experience shall have taught him that the lower buds are not progressing well, then let him cut below the point of junction of the first and of the second growths. The object is to concentrate anew the summer sap of the lower buds, so as to develope them, without causing them absolutely to burst. This is almost sure to succeed. Should, however, the buds not become formed, then the pruner would be justified in cutting right down to the lower two buds, because the shoot is of little value, and the worst that could then happen would be to cause the bud to break, and the shoot would then have to be cut in very closely at the winter pruning.

We suppose that the two upper buds burst. In this case the buds at the junction, and those on the second growth, are very valuable. In the orchard-house these are certain fruit-bearers, and out of

doors they may also be generally relied on, being formed so early in the season. If only the extreme or point-bud burst, then the lower three will give ample chances of fruit. In any case we have both the junction-buds and the ordinary triple groups of long pruning to depend on, thus uniting every chance.

There should always be at least two shoots on each spur. The object is to prune them alternately, as fruit and wood bearers. One of these, the most promising, is left long to bear. It is cut above the junction-buds, because, as a rule, we must not cut too near to the group which is to bear, and at the junction are several wood-buds. The other shoot on the spur is cut rather closely in, but not so as to sacrifice some well-placed groups. It is cut, however, quite near to the point whence the new succession shoots are to appear.

In time a certain number of shoots will spring from each spur. Of these we leave the best long to bear, and the others are cut in closely for succession wood. Of the bearing shoots—say two, one is left longer than the other, and, if desired, tied in. This is to economise the wall. One shoot having two or three good buds is really enough in practice to secure succession shoots. In the orchard-house we preserve all we can. In the open air forerights are preferably removed at the winter

Fig. 19.—PRUNING BY ALTERNATE SHOOTS.—WINTER.

pruning, but there need be few, because such shoots as show this disposition could be very closely stopped to two leaves, and so become short spurs.

Young trees under this system, should only have their first year's shoots equalised at 6 or 8 inches. At the first winter's pruning these shoots should be cut in to two good eyes, thus forming a short shoot, which eventually becomes the spur. The next summer each of these two buds puts forth a shoot, which is then ready to be manipulated to four leaves, to two, and to one leaf.

Beyond equalising the branches, and directing them into the proposed shape, no further shortening of the branches takes place. Blank spaces are filled in by grafting by herbaceous approach, or by budding.

Under long pruning the leading branches were excessively shortened, thus throwing the shoots out into corresponding length. The modern style, on the contrary, allows the branches to remain at full length, merely suppressing any rampant growth, and equalising all the parts, while the shoots are closely pruned to concentrate the sap instead of dispersing it. To closely prune the shoots, and, at the same time, reduce the length of the leading branches, would be to dwarf the tree; but to allow the growth to take place only where it is required, is evidently the natural way. Any

form of tree flourishes when thus treated, for it is a return to first principles.

Fig. 18 represents the system I have been describing. This is the autumn appearance of the two shoots springing from the central spur. In this figure it is easy to distinguish how the four leaves of the first summer-stopping have fared. In either shoot only the point-bud has made a second growth, which has been stopped to two leaves, and a third growth, which has been stopped at one more leaf. The junction-buds (where the point-bud burst) appear full and healthy. One of them, in the right shoot, even shows a disposition to become a cluster spur. This reveals to us the secret of the original theory. The small leaves at the base of either shoot are not counted in the four. This beautiful specimen was carefully drawn from nature, and is a perfect illustration of the theory advanced.

Fig. 19 represents the winter pruning of these shoots. A is the original spur. B is the right shoot, which has been selected to bear (both shoots are, however, perfect) mainly on account of the presence of the good buds at the junction F. The second growth, E, has been left (this is optional here). The left shoot, C, is cut to the lowest group of triple buds; for the central bud of this group, being a good wood-bud, will give us a strong new

shoot, which will be stopped at four leaves, and be kept to bear in its turn. At its base are reserve buds which may become cluster spurs, or put forth other succession shoots. Any of the three good groups left on the shoot, B, may bear the fruit. If the highest be selected, its central wood-bud should be stopped when it has made two leaves, there being abundance of leaves at the junction above it. The remaining groups, and, perhaps, the latent buds at the base, will now extend, and afford the pruner ample scope for his skill. C is to bear the fruit now; therefore, B has to provide the succession wood. Besides this, however, it is proper to develope one shoot more on B, at least, so as to multiply the chance of fruit, and so that by the winter, the spur, A, shall have three or four shoots of various kinds found on it to select from.

No. 18.—Orchard-house Pruning and Training.

It is evident that this summer-stopping of the shoots to four leaves is not only well adapted to trees on the open wall, but, as it economises space, time, and labour, it is also equally well suited for wall trees in orchard-houses. To show that this is possible and easy to accomplish in either case, is

one main object of this work. To reduce Peach-pruning to its simplest and most natural elements is to do away with all the needless and wasteful appliances which have hitherto been such hindrances to amateurs. In orchard-houses, especially, it is desirable to make use of a system combining simplicity of detail with a saving of time and physical labour, both of which amateurs have not always at their command.

Considering the immense advance in Peach culture which those invaluable structures, orchard-houses, have produced, and how many of them are chiefly managed by amateurs, it is evident that such laborious contrivances as ties, and such needless complications as disbudding (too often insisted on, even by excellent pruners), must end in wearying and disgusting many to whom the orchard-house would prove a pure and innocent enjoyment. Neither would it be advisable to have one method of pruning, close, for in-doors, and another, long, for the open air. This would create confusion, and hinder progress. It is a mistake to suppose that wall trees and espaliers under glass, or in the open air, require any substantial difference in their mode of treatment.

The case of potted trees, such as bushes, flat-topped or pyramids, presents no greater difficulty. The shoots on all bush trees in pots should be

stopped at three leaves—*i.e.*, one leaf shorter than on more developed forms on walls, as soon as five full-sized leaves have been formed. The object is to allow the sap to habituate itself to this, its natural channel, and thus permit the shoot to become somewhat hard before it be shortened. The upper buds will soon burst forth into a second growth. Generally, only the upper two buds will thus burst, but, in the case of strong vertical shoots, all three may do so. This is no great matter for trees under glass, where they are sheltered from atmospheric changes, and especially saved from any rank growth caused by a sunless and rainy summer. In the open air it would not be desirable to cause all the buds thus to burst, as was the case in the original system, because, in cold and humid climates, we could not depend on a crop formed entirely on the junction buds; and we thus require, in addition, to have a good triple group lower down the shoot, which is obtained by pruning to four leaves, as before said. In the case, however, of bushes, restrained in their growth in pots, and under complete control in their root-development, pruning to three leaves will be found the best.

Soon afterwards the second growth will push forth, and it will be necessary to arrest it somewhat abruptly, so as to concentrate the invaluable spring sap upon the lowest buds for a week or two. This

space of time ought, in the orchard-house, to constitute them well. The second growth then should be stopped at two leaves, as soon as three leaves are formed.

Stopping the third growth is not very important. It may be checked at two leaves if the shoots prosper; but should the tree appear generally too feeble, arising from undue cropping or from attacks of insects, it would be best to allow the third growth to extend in proportion. The pruner will soon know when to check and when to allow growth. It is also evident that the shoots on the lower portions of the bush trees, and especially under the branches, will not be so vigorous as those near the extremities, which receive so much sap, and are so much nearer to the glass; therefore, on these lower parts, the pruner will expect only cluster spurs, which must not be touched, and, in the central portions, barren spray. This last disagreeable type of shoot should be removed whenever possible. It is considered by some as a proof of degeneration in the tree; by others it is considered as able to bear. It cannot, however, be utilised, having no terminal leaf bud, which it is necessary for every class of shoot left to have. Shoots well placed on the lower portions of bush trees, if not crowding towards the centre, which should always be left open to the sun and air, are

very valuable, and should be carefully looked after. In lofty houses, however, from the tendency of the sap to ascend, the lower portions of bush trees of a certain age and size cannot be depended on. All Peach growers agree that fruit on the lower branches is not of the best quality. The shoots, therefore, placed low down, must be as well exposed to the sun as possible. Bush trees in low houses, having their centres well exposed, ought,

Fig. 20.—COMMON ORCHARD-HOUSE SHOOTS.

nowever, to produce fair crops. Advantage should be taken of shoots springing low down to remodel the tree, and, of course, these shoots must not be pruned.

Bushes appear to most advantage when symmetrical and well balanced. Training *en gobelet*, or U-shaped, allows a large number of leading branches to spring as low down from one central main stem as is practically useful. Another excellent form is to develope three strong branches, and, when these have reached to about 12 inches, to group on each a sufficient number of lateral branches, so as to form a good circle. From these lateral branches other vertical ones may be carried upwards. Several seasons being required for this form, the tree is kept well under command.

Flat-topped trees in pots form a valuable class. Slightly pendulous, which is natural to some Peaches, they bear fine fruit. Intermingled with bush trees, they allow these last more lateral scope, and they suit the loftier portions of the house. The pruning of their shoots is similar to that of bushes. The only difference consists in keeping down those shoots inclined to be vertical, and in watching to cut out gross shoots.

Pyramidal trees in pots are the trees most under command. They should not be carried very high; about six or eight feet is the most manageable

height. The lower parts are always apt to languish. As the object is also to form these portions, the first pruning of the shoots, on the upper third of the pyramid, might be to three leaves, the middle third might be allowed one leaf more, and the lowest third be pruned to five leaves. The second stopping, in all cases, should be more abrupt, and be at two more leaves of the second growth. The point of the pyramid should never greatly predominate. All this pruning is easy to accomplish, and the summer and winter work can be done with a pair of scissors, kept as sharp as possible. This

Fig. 21.—COMMON ORCHARD-HOUSE SHOOTS.

is much the best way of shortening such close-lying shoots. Old-fashioned pruners will not readily abjure the use of the fatal knife, which is only useful to trim those larger branches which must sometimes be sawn away. When this is done let the pruner remove the branch entirely, and quite close to the part left. With this exception, a pair of scissors kept very sharp, and about four inches long, have served for the whole of my trees of every kind for years, both in-doors and in the open air.

In *figs.* 20 and 21 we have three types of shoots which are most common on bush trees, after being several seasons in pots. They are taken from photographs. In either of them we readily recognise the shorter shoot, a certain fruit-bearer in the orchard-house, class 5. In *fig.* 20 we have, besides, the shoot called fruit spray, class 7. This is also a common and productive type, having single fruit-buds and a terminal leaf-bud. It is common on old trees to see whole branches, whose office seems only to be to carry these fruit-bearers, which must not be pruned. *Fig.* 21 is given mainly to show the short and beautiful shoot of class 2, fruit shoot properly so called. In long pruning this is the mainstay of the system. It is rarely seen so short out of doors, but being photographed from the Stanwick Nectarine, which is a very strong-growing

tree, it seems like fruit spray passing into another type, through the vigour of the sap. In all these specimens the pruner will notice with pleasure that there is a terminal leaf-bud, and also a good bud well placed low down the shoot, so that it is easy to secure new wood for next season without extending the shoot too much. This is the very closest style of pruning possible in the Peach.

No. 19.—Orchard-House Pruning and Training.

Among the various beautiful forms suggested by cordon training none is superior to the spiral cordon. This style is excellent in every way, productive, manageable, and elegant in appearance. Visitors invariably prefer it, and during the blossoming period it shows to the best advantage in the whole house.

There are various ways of forming the spiral cordon. Two trees, equidistant, may be planted in the border, and curled round wires or rods as desired. The diameter of the spiral need not exceed 15 inches, and at this interval there is no fear of crowding the spurs and shoots. A Peach and a Nectarine tree look very well together thus placed. Round the pillars of an orchard-house is the most natural position for a spiral cordon. I

have, however, thought of late to place five trees together, equidistant, in the border of the house, and to coil these, at regular intervals of 12 inches, round five upright wooden rods firmly fixed in the ground. These five posts are connected at the top by a stout iron hoop. In this case the diameter of the spiral should be greater, and be about 2½ feet. This plan will be found very advantageous for utilising the central borders of the house. Light and air are freely admitted within the spiral, and every part bears well. Indeed, the form seems so natural to the trees that the spurs on them are unusually strong. The continuous ascending curve favours the development of the tree, while it encourages healthy shoots all round. Sometimes the ends of the spiral cordons are allowed to run along the rafters, or they might be slightly pendulous, to check any rank growth; but of this last there is little fear. Cordon trees in full bearing are never over-luxuriant, but rather the reverse: therefore we should encourage them to grow rather than dwarf them. Trees thus trained never require lifting nor root-pruning, which is a great saving of labour.

The shoots of spiral cordons may be treated as those of bush trees, and be stopped at three leaves, if the intervals between the twist be 12 inches. Second growths should be stopped as usual at two leaves.

There is no reason why Apricots and Plums should not form handsome spiral cordons. Cherries might produce too much wood.

For the back wall of any lean-to no method equals the diagonal cordon. If the house is low, say about 9 feet high, then no very strong trees should be thus trained, and those of moderate growth would require the double or triple cordon. For houses with 10 feet of back wall single cordons of moderately vigorous kinds would suit. Twelve or thirteen feet of back wall is the best height for single cordons. They will not be long in reaching the top, and when there there is no trouble in keeping them close. Very strong sorts, such as the Stanwick, may be double cordons on such a wall; but there is no doubt that the single cordon is the easier to form.

The distance between the trees, counting from stem to stem, varies according to the style of treatment. If flat cordons, with the shoots rather closely kept, be decided on, then 12 inches from stem to stem will suffice, and there is no practical difficulty in keeping the spurs and shoots within these limits, as the amateurs, now rapidly increasing in number, who have adopted this style, will testify.

Trees grow naturally towards the sunlight, and thus produce, if allowed, numerous forerights. Out of doors we should soon lose the benefit of

the wall radiation and shelter if these were not restrained; but in orchard-houses this is not the case. There, forerights are the rule rather than the exception. Flat diagonal cordons, then, are easy of formation, and can be trained without any more difficulty than fan-shaped cordons. Of late I have gradually been led to adopt a larger form of the diagonal. In the new house just planted the trees are placed as single cordons, being old trees transplanted, and the oldest in England of this form, against a 13-feet back wall, at intervals of 15 inches. All the roots were found to have been produced in a forward direction, towards the light, and thus no difficulty arose in planting or transplanting from lateral development, as we expected. These trees have straight stems about 2 inches thick, and the spurs on them are generally half an inch in thickness. On these spurs are from six to ten shoots, which project forward, and are sometimes spread out symmetrically by ties. These large spurs and shoots require but little winter pruning, as most of the shoots on them are of classes 5 and 7. They look exactly like a small bush tree grown in an eight-inch pot, and could bear nearly as well. In replanting these trees the lower portion of each alternate one is now made to project about 12 inches from the wall, the remainder lying close to it. The object of this is to

acquire more space for the roots, while the shoots on the lower third of the tree thus advanced will be allowed to grow all round, as in pyramidal cordons. Thus the space gained by advancing the alternate trees will be utilised, and the tree be allowed to make more wood at that part which most requires it. At about five feet from the ground the stem is allowed to touch the wall, and is trained, like the others, close to it. The angle of inclination of all is only about 6°, as the trees are now full grown and established. To distinguish them from the usual flat diagonals, I have named them "diagonals with pyramidal bases."

The advantages of diagonal training may be briefly summed up as follows:—The trees come sooner into bearing, which is only to be expected, as each tree lies at the natural angle made by a branch with the parent stem; the wall is sooner covered than by any other mode; many varieties can be grown side by side, and those not found good replaced; a succession is obtained from the same wall, which is a great object in small houses or gardens; the produce is large; the training is not more difficult than is the case with other forms; and the trees are very readily untied to cleanse the wall—also a matter of importance.

There is little doubt that, when better known, this form for the back wall will become common.

Mr. Richard Clay, of Hampton Court, has had the happy idea of largely adopting this method for his large span-roofed house, 160 feet long by 16 high, and of great width. In this house there are six rows of diagonal cordons, trained parallel to the length of the house on wires at an angle of 45°, with shoots on both sides. The produce of this new house is already very great.

For the open air it may be questioned if, in this climate, the diagonal is sufficiently large of form, and therefore suitable, although it succeeds in France. It is, however, strange that it is not more adopted for Pears, Apples, and Plums on the open wall, where a large variety and a succession of fruit is desired, and the walls are more than 11 feet high. Cherries are rather rebellious under this form. Plums do very well, requiring, however, the triple cordon; very strong-growing sorts might not suit. For choice Apples, however, and especially for Pears, there is no question of the advantages to be derived from this simple and natural mode of training. It is much adopted on the Continent, and will gradually make its way here: not, however, that English gardeners need this teaching. I believe I may say that Mr. Pearson thinks highly of this form, and I know that Mr. Rivers does.

The easiest method of forming a diagonal cordon

is as follows:—A well-drained trench, 2 or 3 feet wide, and about 1 foot deep, is made along the wall of the house. Healthy and vigorous young Peach and Nectarine trees are then laid against the back wall, at intervals of 12 inches if for the double and triple cordons, in case the walls be low, and at 15 inches if for the larger-developed form, described above as single cordons. The trees should have healthy buds and shoots all along their length, no vacant spaces from accident or otherwise. The first year they may be upright, or at the angle of 70°, according to their vigour. The second year, if prosperous, they may be lowered to 45°, there to remain. In the first winter of planting about one-quarter of the tree may be cut off, always to a front bud, as thereby the future growth presents less deformity at the point of junction. Wires or trellises placed at angle of 45° much facilitate the training, as the object is to have the stems as straight as possible. If placed otherwise, guiding-rods for the young wood will be necessary, with frequent ties—say at every 6 inches. The trees will largely benefit by no fruit being taken from them till they are three years old, and then only one or two specimens. There is no loss of time, as these trees can now be had 6 feet long at Mr. Rivers', and by resting them one year they will bear every succeeding season, lasting the usual time

of any such trees. After the first winter's heading-down, no further shortening of the trees is needed. Provided the shoots and roots are then well looked after, the leader or leaders may be left alone. Accidents may be remedied by grafting by herbaceous approach, an easy and certain way.

The next form of cordon which I shall notice is the lateral cordon. This is best described by Mr. Rivers in speaking of the ground vinery, which is also admirably adapted for the close cordon training of Peaches. "There are no cross bars, but merely a frame; in the top bar is a groove half an inch deep; in the bottom bar a groove a quarter of an inch deep; in the bars at each end are grooves half an inch deep. The pieces of strong 21-oz. glass, which should be cut so as to fit, are pushed into the upper groove, and let fall into the lower one. The two end pieces of glass are then pushed inwards, so as to bring the pieces close together. A little putty at the lower bar keeps water out, and a little is also applied to the end pieces, so as to prevent lateral motion. The width of such a span-roofed frame should be 3 feet at base; 20 inches of height to the ridge; slope in all, 24 inches." In such a structure two Peach trees laid horizontally side by side, and raised on rods or wires sufficiently to keep them free, would produce the finest fruit. In lengths of 7 feet, only

one at each end being closed, these structures are easy to manage, and would be very economical. It is easy to see how only close pruning, as described, could be practised in such cases.

An adaptation of these principles, wherever the front walls of an orchard-house were available, would be to take one-half of the span of this "ground peachery," which would give a light 7 feet long by 2 broad. Some bricks or perforated planks, placed 30 inches from the wall of the house, form a rest for the lower edge of the light, and afford low ventilation, which is also secured by an interval of 2 or 3 inches being left between the upper edge of the light and the wall of the house. Tiles or slates make the best floor for such miniature lean-to houses. It is easy to place hinges so as to open them, and they should be secured from high winds lifting them. Mr. Rivers wrote to me very recently, "It will be a hard fight between these low lateral cordons and diagonals as to produce." No doubt of it; and if the back wall of the house and the low front be thus utilised, it is difficult to conceive how they could be better employed. The roots should be placed on a well-drained spot, and the shoots of these lateral cordons stopped at three leaves as soon as five are produced, and second growth at two leaves as soon as three or four are developed.

No. 20.—Orchard House Pruning and Training.

Bush trees in pots have apparently the advantage of being easy of formation; but though readily kept in shape for a season or two after potting, they are apt to be thrown out of a true balance by any strong vertical shoot which may be overlooked. It is, therefore, on the whole, safer to induce the bush tree to assume some more regular shape, such as the pyramidal. In this case we may, by extra width at the base, cause the tree to look much like an ordinary bush, whilst we retain the advantage of having a main central stem, from which the branches can be more symmetrically developed, than if the tree divided into two or three strong branches at the outset. By keeping the top of this low pyramid very little in advance, and allowing the base to extend freely beyond the pot, this form assumes an aspect different from the lofty pyramid, with its comparatively slender base.

When, however, the bush form is retained, it is imperatively necessary to keep the centre open to the influence of sunshine and air. In this case, also, regularity of form is not only more pleasing to the eye, but conduces to the duration as well as to the productiveness of the tree. It is necessary

generally, to put down the leading branches so as to induce the tree to form the U or goblet shape, and also to keep the branches at proper intervals, by means of slender rods. One season of neglect is enough to spoil the whole appearance of any bush tree; indeed, it is rare we see any very handsome specimens after a certain age. Half standards are much easier to keep in form.

Generally speaking, after a maiden tree has been headed down to six or seven buds (an odd number being preferable), the shoots proceeding from these buds should be trained carefully from the outset, and regularly stopped to equalise their growth. Should the tree not put forth a sufficient number of shoots, cut off the ends of those formed early in June, and from their points second growths will spring, from which the requisite number can be selected to shape the tree. This is for ordinary bushes; possibly for U-shaped trees where the shoots are strong, it would be preferable to cut them back in May, so as to induce them to fork lower down. The equalising of the whole form is to be continually attended to by stopping any shoot which protrudes. By cutting to a bud which points outwards, the centre is kept more open in any case. Any laterals, later in the season, on the upper portions, can be slightly equalised as shown in No. 14.

At the October pruning the tree is formed, according to the shape decided on. Goblet-shaped trees, with long vertically inclined shoots—*i. e.*, branches in future, should have these left longer, and not much shortened-in. Perhaps one-fourth is sufficient, generally speaking, to suppress now. A few laterals may thus be retained within these dimensions, and these should be cut-in to two buds. Low pyramids will have to be cut back to a convenient group of triple buds, or to some single wood-bud looking outwards. Tall pyramids are treated in much the same way. The first winter regulation is important for the beauty of the tree. In pyramids our greatest attention is needed to establish the lower portions from the commencement, and never to allow these to languish, nor to bear too early.

During the ensuing summer the side shoots are to be stopped at three leaves, &c., as before directed in No. 18, for potted trees. If the summer-stopping of this, the second season of the tree being in a pot, has been regularly done at the winter regulation, the tree will begin to assume a certain definite shape, and the pruner will be less puzzled than in dealing with more irregular forms.

It is always better to avoid cutting down potted trees, and rather to rest them for a season, by removing the fruit and remodelling them. When-

ever, however, a tree resists this care, it will be found that it suffers from some serious cause. The roots should be carefully examined, and if unhealthy, the tree should be at once removed, and another young one brought forward from the reserved stock. A few trees thus reserved will save much annoyance. Overcrowding is a fertile cause of the trees becoming shapeless and unproductive. In general, also, sufficient attention is not given to selecting handsome and regular shapes for potted trees.

The advice of some experienced person is of great use in the disposition of the trees in an orchard-house. The variety of forms and climates precludes any general rule in this matter, and doubtless, we have all very much to learn in this respect. We have started from a good and tried basis, however, and may experimentalise without serious risk. The mere beginner, however, had better be cautious, and secure the soundest advice within his reach ; at least, in such important points as the best shape and situation for his new house, and the selection, and disposition of the trees within it.

If the summer-stopping of the shoots be both easy to describe and to perform, the same cannot be said of the winter pruning In this case there is no better way than to have recourse to our classi-

fication of the Peach shoots, and to state in what respect the winter pruning of each differs.

Peach trees in pots are stopped at three leaves, as soon as five are formed; and second growths at two leaves, as soon as three are formed; third growths generally to one more leaf, unless autumn growth be desirable to relieve the tree. (See No. 18.) In the open air, however, the first summer-stopping is made at four good leaves, as soon as six are developed; and second growths are stopped at two leaves, as soon as four more are grown. This gives us more freedom and secures junction-buds, and also the triple groups below them. This is described in No. 17.

This style of stopping to four leaves is also the best for diagonal cordons, on the back walls of orchard-houses, when single, and, therefore, at about 15 inches interval. If planted at 12 inches interval between the leaders (being double or triple), then stopping to 3 inches may be advisable. Even then, in many cases, four leaves may be left with advantage, especially at the base. We have thus one single system of summer-stopping adapted to orchard-houses, and to trees on the open wall. It will now be seen, also, that the winter regulation of the shoots can be conducted without any more distinction between house and open wall.

Recurring, then, to the classification of the

shoots, it may be laid down as a fixed rule, that classes 5, 6, and 7, should never be touched at the winter pruning. Class 5, or the cluster-spur, is a perfect type, able to bear and also to extend by means of its central leaf-bud. It is found in abundance on trees in pots, and on all kinds of cordons on walls. It is the mainstay of the close pruning system. *Figs* 5, 20, and 21, in support of this view, are photographed. On the shoots of diagonal cordons of a certain age, this class is most common. In *fig* 22, all marked B, are cluster-spurs, or "bouquets de Mai," as the French call them. Class 6, is the same spur after bearing. (See *fig.* 6, No. 9.) A little practice will enable the pruner to recognise it, and as it is short and has a terminal leaf-bud, it must be left untouched now, so as to make a new shoot during the summer. Of course, all below this growth will be bare for ever, but this is not of much consequence, as is evident in *fig.* 22, where C shows its relative length and position. Class 7, or fruit-spray, is also a valuable type of shoot, very common in close pruning. In *fig.* 7 (No. 9), and in *fig.* 22, where it is marked A, we have examples of this class. In *fig.* 20 (No. 18), it is also seen, the engraving being taken from a photograph; it has a terminal leaf-bud, and can bear, having single blossom-buds. If it had no wood-bud close to its

base, it might not be so useful, but it generally has. Whenever, however, it occurs in the centre of bush trees in pots, it will then be found to be too long and liable to become straggling; in fact, too like Class 8. It may, but only in this case, be cut out, otherwise when it occurs in close pruning it should be retained as much as possible.

Class 8, *fig.* 8, is barren spray, or "chiffon," as Dubreuil calls it, an unsatisfactory class of shoot, which had better be suppressed whenever no great gap is caused thereby. Bush trees in pots are frequently ruined by such shoots, and they indicate neglect of summer-stopping, or weakness of the tree from want of air, &c. This type has single blossom-buds, but no terminal leaf-buds, hence its name.

Class 2, *fig.* 2, fruit shoot of the ordinary character. In long pruning it is seen of almost any length; but in close pruning the beautiful shoot shown in *fig.* 21 is what we should prefer to see. In this case, being only about from 4 to 6 inches in length, we may allow it to remain untouched at the winter pruning, and cut it close in to the one or two wood-buds seen at its base, after it has produced fruit. When longer it then becomes useful to form a new branch, and thus ceases to have the distinctive character of the shoot seen in *fig.* 21. Class 3, or the mixed shoot, is also

common in young trees, and useful to shape them. Whenever, then, either of these types occur as extensions of any form of tree, they should not be shortened after the first year or so. In close pruning we soon cease to think of them as shoots, and rather incline to regard them as useful to bear the shorter ones only.

Class 1, *fig.* 1, pure wood-shoot. Naturally inclined to grow long, and having a few feeble blossom-buds at its extremity. Seen in young trees, and also in the extensions of older forms, and only useful in this respect, as laying the foundation of riper wood.

Class 4, *fig.* 4, the gross shoot, or "gourmand" of the French. A vigorous development of Class 1. Useful to form young trees quickly, but to be carefully watched in older forms lest the tree be thrown out of balance. As the main stem of a healthy pyramid in the border, or in the case of a fan-shaped tree on the wall, where it is preferred not to divide the tree into two wings, much progress is made by it. It is readily known by its darker colour, the smallness of the leaf-buds, and the premature laterals thrown out at the upper portions. In close pruning, however, all these naturally long shoots become, practically, only useful to form the tree, while the naturally shorter shoots are retained to bear the fruit. By

allowing the branches to remain at full length after the first or second season, and by the close summer-stopping of the shoots, we increase this distinctive character, and thus return to first principles.

Although more regular forms are desirable, there is no reason why irregular fan-shaped trees should not bear well, when closely pruned. In some cases this form may be even the best adapted, and, no doubt, much advantage is gained by having a biennial supply of young and healthy wood. Gaps made by unskilful pruners may thus be filled up. *Fig.* 22, however, clearly shows how it is possible to have regularly disposed branches, and, at the same time to preserve the spurs on them for many seasons, without recourse to amputations or fresh wood. In this specimen, drawn from nature from a diagonal cordon about ten years old, it is evident that the double spur is as old as the parent tree, and this without being more than a few inches in length or half an inch in diameter. The left spur bears the marks of numerous suppressions of former shoots. It retains two of these three or four seasons old, and only respectively 1 inch and 2 inches long. On the upper one are the cluster spur B and the fruit spray A; on the lower one is another cluster B, and this same type after bearing, C. Springing from the very base is a pure wood-shoot D, which has been cut back to two wood-buds

to form succession shoots. The spur on the right is not so thick as its fellow, but also shows marks

Fig. 22.—DOUBLE SPUR TEN YEARS OLD.

of work. It bears three fruit sprays A, and four cluster spurs B. Also at its base we find a shoot having groups of triple buds (class 2), and cut back above the lowest of these groups. This shoot is cut back for the same purpose as that marked D, and is itself marked E. It is, therefore, quite evident that the whole of the two aged spurs might be cut off after bearing, leaving some four or five new shoots springing from D and E. These spurs and their beautiful fruit-bearing shoots thus seen, are really a triumph of close pruning. No one can reasonably doubt that there is a promise of abundant fruit here, lying close to the wall, and produced by a type allowed to be that which bears the very largest Peaches. It would not be at all necessary to remove these fine old spurs, as the shoots on them will not become very long for some time, so that the "modern close pruner" is never embarrassed by any want of material to select from. His great aim must be to endeavour to prune the shoots on the "alternate system," seen in *figs.* 18 and 19, which, duly attended to, will, after many seasons, produce specimens resembling *fig.* 22.

It remains only to add that *fig.* 23 represents the plan of formation of the wall of diagonal cordons. As my good friend Mr. Rivers has lately erected a house which he justly estimates as likely, from its immense proposed length and novelty of de-

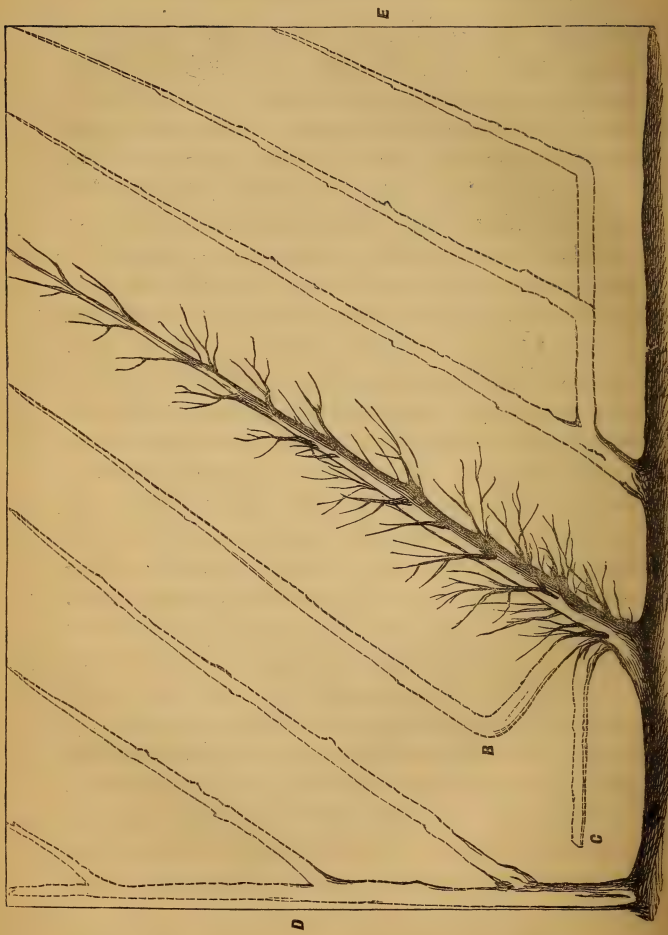

Fig. 23.—FORMATION OF WALL OF DIAGONAL CORDONS.

sign, to prove "one of the sights of Europe," and as the back wall of this house is devoted to diagonal cordons, perhaps this design may be useful. A represents the angle of a diagonal cordon against the wall. It might be even lower. A would be a single cordon without the addition of leader B, which will make it a double diagonal cordon. C is a short branch to fill up an interval; not very necessary, nor very productive. D is an upright cordon from which leaders are taken to fill up the wall space at one end, while E shows how the other end should be finished. If the horizontal portion of E were first well established, the leaders could be readily developed from it. It is also of importance in forming the double or triple cordon to keep back the second leader about half-way the length of the first, otherwise the second leader would, from its vertical position, absorb too much sap; in other words, establish the first leader well before the others are formed.

The late and lamented Dr. Lindley, in reviewing "Cordon training," objected to the sharp angle made at B, as shown in the frontispiece of that work. It is now remedied; but in actual practice it never was so severe. Otherwise, he thought well of this system, and it is now presented under an improved aspect, the result of five more seasons of experience.

21.—Variations of Peaches and Nectarines from Seed.

(From the Fruit Record of Sawbridgeworth.)

The great increase in the number of varieties of the Peach and Nectarine which are now cultivated is due to the introduction of orchard-houses. By these means a long succession of fruit is obtained. Very early and late sorts thus matured are of immense advantage. Of course, with the increased number of sorts the difficulty of proper selection keeps pace. It is, therefore, necessary to add a list of choice kinds. The Peach-fancier, however, can now raise varieties from seed for himself, and by judicious fertilising obtain new sorts, the fruiting of which will at least be a source of infinite pleasure. Having myself experienced this satisfaction, and successfully fruited some Georgian varieties (such as Exquisite, Golden Purple, Canary, Thomas's Late, Baldwin's Late, and Stump-the-World), besides holding a number of fine seedlings as yet unfruited here, it occurred to me to obtain further information on this interesting point; and the answer of Mr. Rivers is as follows:—

"The seedlings of 1865 were about two hundred in number. Their qualities and deviations from the parent stock have been accurately noted

down. They are numbered for reference, and dates of ripening added.

"No. 1. August 10th. An orange Nectarine from Fairchild's Early. Liable to crack.

"No. 2. August 10th. A seedling from Early York, but having leaves with glands, and thus not liable to mildew. Flowers large, like the parent, and the only one out of twenty which deviated from the parent stock.

"No. 3. Oct. 1st. A seedling from a yellow clingstone. Small but rich, with large flowers.

"No. 4. Sept. 20th. A very large clingstone from Early York, in the third generation. This is a remarkable variation, with the large flowers of the race.

"No. 5. Sept. 4th. A Peach raised from the Balgowan Nectarine. Small, rich, with small flowers.

"No. 6. August 16th. A large Peach from Pêche Dèniaux. Of a delicate cream colour, slightly tinted with red under the skin; firm flesh, and delicious aroma. The parent I found in a small nursery in Brittany as a robust standard. This remarkable Peach has been since named Dr. Hogg, and is first-rate.

"No. 7. August 18th. A large and deep crimson seedling from Belle Bausse, differing from it in its flowers. Called the Crimson Mignonne.

"No. 8. August 20th. A very large pale Peach raised from a white Nectarine, itself from the New White Nectarine, so that this Peach is the third generation from a Nectarine. Flowers small.

"No. 9. August 10th. A large early seedling from Early Albert, which was raised from an early Belgian Peach, called Montagne Précoce. A very valuable early Peach, called by the Fruit Committee the Dagmar Peach. Flowers small.

"No. 10. Sept. 18th. A Peach raised from that large sort, Pavie de Pompone, and small, with its rind of a pale straw-colour, without the least red tinge. I mention this to show the great diversity of character often originating from the same stock, as will be seen presently. Exquisitely sweet. Flowers small.

"No. 11. A large pale yellow seedling from Royal George. Flesh remarkably juicy, like its parent, and totally unlike the yellow American and south of Europe Peaches. It has none of the Apricot flavour. Called the Golden Royal George. Flowers small.

"No. 12. August 12th. A medium-sized melting Peach, seedling from Hunt's Tawny Nectarine. Named by the Committee the Early Alfred Peach.

"No. 13. Sept. 30th. A very large cream-coloured clingstone from American Heath-cling.

I mention this clingstone, passing over many others, as being, unlike its parent stock, very juicy. Flowers small.

"No. 14. August 10th. The Early Silver Peach, the first generation from the New White Nectarine. One of the most beautiful Peaches. Skin pale silver, pink-tinted. It is the parent of many seedlings, all of high character.

"No. 15. Sept. 8th. A large late Nectarine from the Elruge, with the Stanwick flavour. It is most curious to note the influence of the Stanwick on the flavour of seedlings, as if the pollen of this peculiar sort had effected a radical change in their character, reminding one of the introduction of the Black Cap Raspberry from America, which has stained all our autumnal Raspberries. Flowers small.

"No. 16. August 28th. A large orange Nectarine originating from Hardwicke Seedling, which is of a totally different character, and itself also differing from its parent, the Elruge. Flowers large.

"No. 17. August 26th. A large green Nectarine, a freestone, raised from the Roman, which is a clingstone. The flavour is much influenced by the Stanwick cross.

"No. 18. A large seedling Peach from the Noblesse. Much like its parent in texture, but,

unlike it, has glands, and thus not liable to mildew, which all the glandless Peaches are. To keep it in its class it is called the Alexandra Noblesse. Flowers large.

"No. 19. July 11th. A remarkably early seedling Peach, pale, red-tinted, medium size, melting and juicy. Raised from a Nectarine, a seedling from New White (the Early Silver Nectarine). This Peach is, therefore, the third generation from the New White Nectarine. This is a remarkable deviation in every way.

"No. 20. July 14th. A medium-sized Peach, marbled with bright red, juicy, and rich. Raised from Early Albert, and likely to be of great value as an early sort.

"No. 21. July 14th. A large pale Peach like the Noblesse, melting and racy. Raised from Early Silver, and the third generation from New White Nectarine. Decidedly the finest large early Peach known, and, with the two preceding, being ripe in July (three weeks before the Early York), likely to be of great value; and probably in Guernsey with skill might be ready by the end of June, when only forced Peaches are to be met with. Called the Early Rivers Peach. Flowers large.

"No. 22, Sept. 20th. A Peach measuring 12 inches round, pale straw, rosy cheek, firm yet

juicy flesh, and rich aroma. Raised from Princess of Wales, and so third generation from Pavie de Pompone. One fruit was ripe, and submitted to the Fruit Committee at South Kensington, and it received a first-class certificate. Named Lord Palmerston. Flowers large.

"No. 23. Sept. 30th. A large melting Peach. Skin beautifully marbled; flesh pale yellow, juicy, and excellent. Raised from Pine Apple Nectarine, and the third generation from the Pitmaston Orange. A remarkable variation. Its parent and grand-parent produce the most beautiful large bright flowers of all. This has given us small flowers. Named Lady Palmerston.

"No. 24. Sept. 6th. A medium-sized Peach, with a bright red cheek. Raised from Hardwicke Seedling Nectarine. The parent has large flowers, but this one has them small.

"No. 25. Sept. 6th. A Nectarine of the largest size, juicy and rich. Raised from Prince of Wales Nectarine, itself a seedling from a Peach. Earlier and much larger. Flowers small.

"These extracts from my Fruit Record show the extraordinary changes wrought by cross-breeding, either by accidental fertilisation by insects, or, as it seems to me, by 'breeding in-and-in'—*i. e.*, by selecting varieties generation after generation, and thus conveying the peculiar qualities apper-

taining to a race. Seedling No. 22 is an illustration of this. In making my collection of every kind of Peach known in Europe and America, I some years since received that largest of all Peaches, Pavie de Pompone. Owing to its great size and to its beautiful rose-like flowers I always felt much interest in it, but its fruit was seldom fit to eat. It was not till 1857 that I thought of raising seedlings from it, for I had slight hopes of raising a melting Peach from a clingstone. I planted, however, some stones; one tree grew, and produced melting Peaches, rather late, but of good quality. It was named the Princess of Wales. This variety has much of the robust habit of its parent, and gives the same grand flowers. The seedling raised from this departed widely from the parent stock, producing small flowers and melting fruit, but not large. In 1862 stones of the Princess of Wales Peach were planted, one of which produced fruit in 1865. This seedling gives fruit firm like its ancestor, Pavie de Pompone, though a melting Peach. This is a case of adherence to race.

"In 1815 the late Mr. Williams, of Pitmaston, planted stones of the Elruge, which has a white flesh and small flowers, and one of these produced a tree which gave large beautiful flowers, and was called the Pitmaston Orange Nectarine. It was the first full-sized orange Nectarine known in England.

I planted stones of this sort in 1856, which, in due time, bore fruit nearly all identical with the parent. One, however, large, and ten days later, I named the Pine Apple Nectarine, owing to its flesh being transparent like the Pine. In 1862 I planted stones of this sort, but the young trees gave slight hopes of deviation. In 1865 several bore fruit, all like their grand-parent the Pitmaston Orange Nectarine, and were laid aside, till one day my attention was drawn to two very beautiful Peaches hanging on one of the trees. Here we have the fourth generation of the Elruge Nectarine, and it proves to be a large and late Peach.

"I may add that till I had bought my experience of the great variation in seedlings I could hardly believe in the origin of the Pitmaston Orange Nectarine. I was, perhaps, more inclined to think so from having received from the south of France, many years ago, a full-sized orange Nectarine under the name of Brugnon Musqué. This gave large beautiful flowers, but was a clingstone.

"I may here mention that, as yet, Apricots have not given the remarkable variation shown by Peaches and Nectarines.—Thos. Rivers."

It will be seen from the foregoing how short a time it requires to test any new variety. Parents having very distinctive qualities should be selected to experimentalise with, and a short experience

will be the best of all teachers. Other numbers might be added on the best shapes for orchard-houses, and their general management, as also on the temperatures adapted to them, &c., but such topics, besides being beyond the limits fixed for the work, are also extraneous to the leading purpose, which was—the training and pruning of the Peach according to the latest experience.

APPENDIX.

No. 1.—Diseases and Insects.

Peach trees are liable to certain diseases, one of the most dangerous of which is canker. Its cause is uncertain. Some ascribe it to abrupt atmospheric changes; others to stagnant water at the roots; others, again, think unripe wood and exaggerated pruning together are the chief causes of this disease. Canker is a kind of ulcer, and the sap vessels thereby pour out their contents and weaken the part affected. It is recommended to clear out the diseased portion, and apply a weak decoction of oxalic acid.

One kind of canker attacks the young shoots, and destroys their circulation.

Blister is a well-known disease of the Peach. It is rare in the orchard-house; but in the case of

trees in the open air, the soil has, by the spring, parted with the heat stored therein, and become colder than the sunny atmosphere enveloping the leaves. Evaporation takes place in the young and tender tissue, without a correspondent supply from the roots; then the young leaves collapse and curl up, and the tender shoots, suddenly arrested in their progress, swell and grow unshapely. In cold and undrained soils this causes much injury to the tree, and much requires to be cut away.

Mildew, a minute fungus or vegetable parasite, often produces considerable injury to the young shoots by its roots piercing the tender epidermis, and so blocking up the stomata or openings which communicate with the interior of the branch. Peculiar states of the atmosphere favour the development of these fungi, and certain varieties are well known to be more liable to their attacks than others. The parts affected should be wiped, and then dusted with flowers of sulphur, which absorb the evil. A little oil paint is also good. Insects are, however, a more severe trial to the welfare of the trees.

The Scale is one of these; it preys on the juices of the stems and branches. The body of the female is wingless, and covers a multitude of eggs under its shield-like form. The male insect is a tiny creature, much smaller than the female, and has a

pair of beautiful wings. It is very active, unlike the female, which clings to the victimised branch, drawing out its juices, by means of a powerful sucker. The males are easily destroyed by fumigation, but the females require to be carefully scraped off the branch. The tree is then anointed with sulphur and soap (two parts of the first to one of the latter), made into a thick paste, with a little black pepper added.

The Aphis tribe multiply so fast as to require incessant attention. The brown aphis preys on the tender shoots and buds, and is succeeded by the green aphis, as soon as the leaves unfold. Tobacco water, applied with a soft brush; or syringing with two ounces of tobacco to a quart of water, boiled and left to cool; or a mild decoction of quassia; or Gishurst compound, very weak. If the house can be shut up closely, nothing is more successful than fumigating with tobacco.

For out-door trees, equal parts of shag tobacco and soda dissolved in boiling water, and used cold. Standing obliquely to the tree is essential. A good washing with the garden engine shakes off many insects.

But the grand enemy of the Peach fancier is the red spider. A high and dry temperature, and a crowded house, soon produces them, besides the eggs left from last season, which seem to appear

first. The red spider is a mite, but has a spider-like manner of forming a web.

Almost all remedies have sulphur for a basis, but many doubt its value now.

For winter-dressing of trees, 8 oz. of Gishurst compound is used by many to the gallon of water. For syringing, from 1 to 2 oz. in a gallon of water. If made some time before, the smell subsides. Painting the walls is practised by some, but not generally liked on account of the staining of the walls. If done, 4 parts of sulphur to 1 of soft soap and 1 of lime is a fair mixture; others add soot to increase its power, and this slightly darkens the walls. In short, sulphur, incorporated with soft soap and lime, is what is most used, in various proportions. Syringing the under portion of the leaves with 2 oz. of soft soap in a gallon of water, or a mixture of size and gum, so as to adhere to the leaf, and glue in the insects and their webs, seem reasonable enough. Violent applications of clear water alone shake off numerous enemies. Many of the remedies stain the fruit and the wood work of the houses, which is thus discoloured for months.

Destroy wasps by May; and trap woodlice in hollowed turnips and such like.

These are the chief enemies of the Peach fancier.

No. 2.—A list of Choice Peaches and Nectarines recommended for the Northern Districts. Placed in order of Ripening.

OPEN WALL.

Hardy—Free-growing Peaches.
- Early York.
- Early Albert.
- Early Savoy.
- Violette Hâtive.
- Noblesse.
- Royal George.
- Barrington.

Hardy—Free-growing Nectarines.
- Violette Hâtive.
- Downton.
- Rivers's Orange.
- Balgowan.
- Pine Apple.

MIDLAND DISTRICTS.

Hardy—Free-growing Peaches.
Early Victoria.
Belle de Doué.
Early Grosse Mignonne.
Royal George.
Belle de la Croix.
Bellegarde.
Gregory's Late.
Walburton Admirable.

Hardy—Free-growing Nectarines.
Hunt's Tawny.
Violette Hâtive.
Elruge.
Hardwicke.
Rivers's Orange.
Pine Apple.
Victoria.

Other sorts for favoured localities.

Peaches—Prince of Wales.
Princess of Wales.
Montagne Tardive.
Desse Tardive.

Nectarines—Victoria.
Prince of Wales.

SOUTHERN DISTRICT.

Hardy—Free-growing Peaches.
Early York.
Abec.
Early Grosse Mignonne.
Violette Hâtive.
Grosse Mignonne
Royal George.
Noblesse.
Princess of Wales.
Late Admirable.

Hardy—Free-growing Nectarines.
Balgowan.
Downton.
Violette Hâtive.
Elruge.
Oldenburg.
Pine Apple.
Victoria.
Prince of Wales.

Other sorts where more are desired.

Peaches—Golden Rathripe.
Stump-the-World.
Comice de Bourbourg.
Grosse Violette.

Nectarines—White.
Impératrice.

ORCHARD HOUSES.

Northern District.

Lean-to's or Span-roofed, with Single or Double row of Hot Pipes.

Hardy—Free-growing Peaches.
- Early Victoria.
- Belle de Doué.
- Early Grosse Mignonne.
- Royal George.
- Belle de la Croix.
- Bellegarde.
- Gregory's Late.
- Barrington.

Hardy—Free-growing Nectarines.
- Hunt's Tawny.
- Violette Hâtive.
- Elruge.
- Hardwicke.
- Rivers's Orange.
- Pine Apple.
- Victoria.

Other sorts recommended.

Peaches—Prince of Wales.
- Princess of Wales.
- Montagne Tardive.
- Desse Tardive.

Nectarines—Victoria.
- Prince of Wales.

NORTHERN DISTRICT.

With little or no artificial heat.

Hardy—Free-growing Peaches.
Early York.
Abec.
Early Grosse Mignonne.
Violette Hâtive.
Grosse Mignonne.
Royal George.
Noblesse.
Princess of Wales.
Late Admirable.

Hardy—Free-growing Nectarines.
Balgowan.
Downton.
Violette Hâtive.
Elruge.
Oldenburg.
Pine Apple.
Victoria.
Prince of Wales.

Other good sorts, but more difficult to ripen well.

Peaches—Golden Rathripe.
Stump-the-World.
Comice de Bourbourg.
Grosse Violette.

Nectarines—White.
Impératrice.

Midland Districts.

Free-growing Peaches.

Early Victoria.
Belle de Doué.
Early Grosse Mignonne.
Royal George.
Belle de la Croix.
Bellegarde.
Malta.
Late Admirable.

Free-growing Nectarines.

Hunt's Tawny.
Violette Hâtive.
Elruge.
Hardwicke.
Murrey.
Rivers's Orange.
Pine Apple.

Other good sorts.

Peaches—Prince of Wales.
Princess of Wales.
Montagne Tardive.
Desse Tardive.

Nectarines—Victoria.
Prince of Wales.

SOUTHERN DISTRICT.

Free-growing Peaches.

Early York.
Abec.
Early Grosse Mignonne.
Violette Hâtive.
Grosse Mignonne.
Noblesse.
Princess of Wales.
Late Admirable.

Free-growing Nectarines.

Balgowan.
Downton.
Violette Hâtive.
Elruge.
Oldenburg.
Pine Apple.
Victoria.
Prince of Wales.

Good sorts.

Peaches—Golden Rathripe.
Stump-the-World.
Thomas' Late.

Nectarines—White.
Chauvière.

In Orchard Houses for Channel Islands.

The newest sorts.

Early Silver Peach.
Comet.
Canary.
Exquisite.
Susquehanna.
Hale's Early.
Van Zandt's Superb.
Washington Rathripe.
Honey Peach.
Early Rivers.
Dr. Hogg.
Early Alfred.
Tecumseh.

Note.—In deciding on the sorts finally selected for the house or open wall, great regard must be had for all such local conditions as tend to modify the above directions. These are—height above sea-level, vicinity or remoteness therefrom, neighbourhood of sheltering hills or belts of trees, easy or difficult drainage, quality of soil, size and position of house or garden, &c. In all such cases local advice should be superadded; but the list given is good, as far as it goes, and has been revised by very good authority

THE END.

Pruning
Peach
Variatio
Rivers

J. E. H.

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